

## AMENDMENT OF SOLICITATION

Page of Pages

1 / 4

1. AMENDMENT/MODIFICATION NO. <b>0002</b>	2. EFFECTIVE DATE <b>MAY 09, 2003</b>
3. ISSUED BY  DEPARTMENT OF THE ARMY, BALTIMORE DISTRICT CORPS OF ENGINEERS P.O. BOX 1715 BALTIMORE, MARYLAND 21203-1715	
4. NAME AND ADDRESS OF CONTRACTOR (Name, street, county, State and ZIP Code)	4A. AMENDMENT OF SOLICITATION NO. <b>DACW31-03-R-0012</b> <hr/> 4B. DATED (SEE ITEM 5) <b>APRIL 15, 2003</b>
5. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <b>is not extended.</b> <b>DATE OF RECEIPT OF PROPOSAL 4:00 PM, LOCAL TIME MAY 22, 2003</b> Others must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing items 4 and 8, and returning <u>1</u> copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of the amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.	
6. ACCOUNTING AND APPROPRIATION DATA (If required)  <b>NEVAL THOMAS ELEMENTARY SCHOOL, WASHINGTON, DC</b>	
7. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)  <b>SEE THE FOLLOWING PAGES</b>	
Except as provided herein, all terms and conditions of the document referenced in Item 4A, as heretofore changed, remains unchanged and in full force.	
8. NAME AND TITLE OF SIGNER (Type or print)	9. CONTRACTOR/OFFEROR  <hr/> (Signature of person authorized to sign)
	10. DATE SIGNED

**SPECIFICATIONS:**

- 1) Table of Contents: Delete the Table of Contents that was issued in Amendment No. 0001, dated March 11, 2003 and substitute therefore the attached revised Table of Contents.
- 2) Page 01781-7: Immediately following this page, insert the attached new SECTION 02115 – UNDERGROUND STORAGE TANK REMOVAL.
- 3) Section 03300: Make the following changes to this section:
  - a) Page-7, Paragraph 1.6.2.1: For caissons, change the strength requirement: from “3000 psi at 28 days.” to “4000 psi at 28 days.”
  - b) Page-13, Paragraph 2.1.1: Delete paragraph as issued and substitute the following sentence: “ASTM C150, Type I, or Type II low alkalai with an alkalai content less than 0.6 percent.”
  - c) Page-32; Paragraph 3.10.1(a): Delete the second sentence as issued and substitute the following: “In addition, at least one test for air content shall be made on each truckload of concrete delivered to the site.”
  - d) Page-32; Paragraph 3.10.1(c): Delete the first sentence as issued and substitute the following “In addition to slump tests which shall be made when test specimens are fabricated, at least one slump test shall be made in accordance with ASTM C143 for each truckload of concrete delivered to the site.”
  - e) Page 33, Paragraph 3.10.1(f): Delete the first sentence as issued and substitute the following: “At least one set of test specimens shall be made, for compressive strength as appropriate, on each different concrete mixture placed during the day for each 50 cubic yards or portion thereof of that concrete mixture placed each day.”
- 4) Page 08710-4, Paragraph 2.3.5: Add the following sentence to the end of the paragraph: “All cylinder locks shall have Schlag C Keyways or Generic SCI Keyways to meet government requirements.”
- 5) Section 16403: Delete this section as originally issued and substitute therefore the attached revised same like-numbered section.

**DRAWINGS:**

- 6) Sheet A105: Revise this plate that was reissued in Amendment No. 0001 in accordance with the attached Sketch ADD-A-04.
- 7) Sheet A504: Revise this plate that was reissued in Amendment No. 0001 in accordance with the attached Sketches ADD-A-01 and ADD-A-02.
- 8) Sheet A801: Revise this plate in accordance with the attached Sketch ADD-A-05.
- 9) Sheet A901: Revise this plate in accordance with the attached Sketches ADD-A-06 and ADD-A-07.

- 10) Sheet A902: Revise this plate in accordance with the attached Sketch ADD-A-07.
- 11) Sheets A904 and A905: Revise this plate in accordance with the attached Sketch ADD-A-08.
- 12) Sheet C200: Revise this plate in accordance with the attached Sketch ADD-C-01.
- 13) Sheet C400: Revise this plate in accordance with the attached Sketch ADD-C-04.
- 14) Sheet C403: Revise this plate in accordance with the attached Sketches ADD-C-02 and ADD-C-03
- 15) Sheet E201: Revise this plate that was reissued in Amendment No. 0001 in accordance with the attached Sketch ADD-E-05.
- 16) Sheet L201: Revise this plate that was reissued in Amendment No. 0001 in accordance with the attached Sketch ADD-L-01.
- 17) Sheet S2.0: Delete this plate as issued in Amendment No. 0001 dated 03/11/03 and substitute therefore with the attached revised same like-numbered Sheet S2.0 dated 04/21/03.
- 18) Sheet S2.1: Delete this plate as issued in Amendment No. 0001 dated 03/11/03 and substitute therefore with the attached revised same like-numbered Sheet S2.1 dated 04/21/03.
- 19) Sheet S3.0: Revise this plate that in accordance with the attached Sketch ADD-S-07.
- 20) Sheet S3.1: Revise this plate in accordance with the attached Sketches ADD-S-08, ADD-S-09 and ADD-S-10.
- 21) Sheet S3.2: Revise this plate that was reissued in Amendment No. 0001 in accordance with the attached Sketch ADD-S-11.
- 22) Sheet T001: Revise this plate that was reissued in Amendment No. 0001 in accordance with the attached Sketch ADD-T-01.

ATTACHMENTS:

- 1) Project Table of Contents
- 2) Additional Submittal Registers for Section 02115
- 3) Specification Section 02115
- 4) Specification Section 16403
- 5) Sketch ADD-A-01
- 6) Sketch ADD-A-02
- 7) Sketch ADD-A-04
- 8) Sketch ADD-A-05
- 9) Sketch ADD-A-06
- 10) Sketch ADD-A-07
- 11) Sketch ADD-A-08
- 12) Sketch ADD-C-01
- 13) Sketch ADD-C-02
- 14) Sketch ADD-C-03
- 15) Sketch ADD-C-04
- 16) Sketch ADD-E-05
- 17) Sketch ADD-L-01
- 18) Sketch ADD-S-06
- 19) Sketch ADD-S-07
- 20) Sketch ADD-S-08
- 21) Sketch ADD-S-09
- 22) Sketch ADD-S-10
- 23) Sketch ADD-S-11
- 24) Sketch ADD-T-01

## PROJECT TABLE OF CONTENTS

## DIVISION 01 - GENERAL REQUIREMENTS

01000 ADMINISTRATIVE REQUIREMENTS  
01020 PRE-CONSTRUCTION AND PRE-WORK CONFERENCES  
01021 PROGRESS MEETINGS  
01050 JOB CONDITIONS  
01060 SAFETY  
01200 WARRANTY REQUIREMENT  
01210 BID ALLOWANCES  
01312A QUALITY CONTROL SYSTEM (QCS)  
01320 PROJECT SCHEDULE  
01330 SUBMITTAL PROCEDURES  
01356 STORM WATER POLLUTION PREVENTION MEASURES  
01420 SOURCES FOR REFERENCE PUBLICATIONS  
01451 CONTRACTOR QUALITY CONTROL  
01460 SECURITY  
01510 TEMPORARY CONSTRUCTION ITEMS  
01520 PHOTOGRAPHIC DOCUMENTATION  
01561 ENVIRONMENTAL PROTECTION  
01572 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT  
01670 RECYCLED / RECOVERED MATERIALS  
01720 AS-BUILT DRAWINGS - CADD  
01781 OPERATION AND MAINTENANCE DATA

## DIVISION 02 - SITE WORK

02115A UNDERGROUND STORAGE TANK REMOVAL  
02220a DEMOLITION  
02300 SITE GRADING AND EARTHWORK FOR ROADWAYS  
02315 EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS  
02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS  
02466 DRILLED PIERS (CAISSONS)  
02510a WATER DISTRIBUTION SYSTEM  
02531a SANITARY SEWERS  
02551 BITUMINOUS PAVING  
02620 SUBDRAINAGE SYSTEM  
02630a STORM-DRAINAGE SYSTEM  
02714 PAVEMENT DRAINAGE LAYER (RDM)  
02722 AGGREGATE BASE COURSE  
02770 CONCRETE SIDEWALKS AND CURBS AND GUTTERS  
02791 PLAYGROUND PROTECTIVE SURFACING  
02821N CHAIN LINK FENCES AND GATES, BASEBALL BACKSTOPS  
02870a SITE FURNISHINGS  
02882 PLAYGROUND EQUIPMENT  
02921a SEEDING  
02930a EXTERIOR PLANTING

## DIVISION 03 - CONCRETE

03100 STRUCTURAL CONCRETE FORMWORK  
03200 CONCRETE REINFORCEMENT  
03300 CAST-IN-PLACE STRUCTURAL CONCRETE

03413a PRECAST ARCHITECTURAL CONCRETE

DIVISION 04 - MASONRY

04200a MASONRY

DIVISION 05 - METALS

05120 STRUCTURAL STEEL

05210 STEEL JOISTS

05300 STEEL DECKING

05500a MISCELLANEOUS METAL

05700 ORNAMENTAL METAL

DIVISION 06 - WOODS & PLASTICS

06100a ROUGH CARPENTRY

06200a FINISH CARPENTRY

06410a LAMINATE CLAD ARCHITECTURAL CASEWORK

DIVISION 07 - THERMAL & MOISTURE PROTECTION

07110a BITUMINOUS DAMPPROOFING

07220a ROOF INSULATION

07413a METAL SIDING (INSULATED WALL PANELS)

07416a STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

07510a BUILT-UP ROOFING

07561 HOT FLUID-APPLIED ROOFING

07600a SHEET METALWORK, GENERAL

07840a FIRESTOPPING

07900a JOINT SEALING

DIVISION 08 - DOORS & WINDOWS

08110 STEEL DOORS AND FRAMES

08120 ALUMINUM DOORS AND FRAMES

08210 WOOD DOORS

08520a ALUMINUM AND ENVIRONMENTAL CONTROL ALUMINUM WINDOWS

08710 DOOR HARDWARE

08716 POWER DOOR OPERATORS

08810a GLASS AND GLAZING

08900 GLAZED CURTAIN WALL

DIVISION 09 - FINISHES

09100N METAL SUPPORT ASSEMBLIES

09250 GYPSUM BOARD

09310A CERAMIC TILE

09510A ACOUSTICAL CEILINGS

09640A WOOD STRIP FLOORING

09650A RESILIENT FLOORING

09680A CARPET

09900 PAINTS AND COATINGS

09960 GRAFFITI RESISTANT COATING

DIVISION 10 - SPECIALTIES

10100A VISUAL COMMUNICATIONS SPECIALTIES  
 10160A TOILET PARTITIONS  
 10191N CUBICLE TRACK AND HARDWARE  
 10201N METAL WALL LOUVERS  
 10350 FLAGPOLES  
 10430A EXTERIOR SIGNAGE  
 10440A INTERIOR SIGNAGE  
 10650A OPERABLE PARTITIONS  
 10675N STEEL SHELVING  
 10800A TOILET ACCESSORIES  
 10900 MISCELLANEOUS CEILING SPECIALTIES

DIVISION 11 - EQUIPMENT

11400A FOOD SERVICE EQUIPMENT  
 11490 GYMNASIUM EQUIPMENT

DIVISION 12 - FURNISHINGS

12355 LIBRARY CASEWORK  
 12484 ENTRANCE FLOOR MATS  
 12490A WINDOW TREATMENT  
 12491N CUBICLE CURTAINS AND DRAPES  
 12492 STAGE AND BACKDROP CURTAINS

DIVISION 13 - SPECIAL CONSTRUCTION

13100A LIGHTNING PROTECTION SYSTEM  
 13280A ASBESTOS ABATEMENT  
 13281A LEAD HAZARD CONTROL ACTIVITIES  
 13282N REMOVAL AND DISPOSAL OF MATERIAL CONTAINING LEAD  
 13283N REMOVAL AND DISPOSAL OF LEAD-CONTAINING PAINT  
 13284N REMOVAL AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBs)  
 13286N HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY  
 13851A FIRE DETECTION AND ALARM SYSTEM, ADDRESSABLE  
 13930A WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION

DIVISION 14 - CONVEYING SYSTEMS

14240A ELEVATORS, HYDRAULIC

DIVISION 15 - MECHANICAL

15050 BASIC MECHANICAL MATERIALS AND METHODS  
 15070 MECHANICAL SOUND AND VIBRATION CONTROL  
 15080 THERMAL INSULATION FOR MECHANICAL SYSTEMS  
 15181 CLOSED LOOP CONDENSER WATER PIPING AND ACCESSORIES  
 15182 REFRIGERANT PIPING  
 15183 CLOSED LOOP GLYCOL/WATER COOLING TOWER PIPING AND ACCESSORIES  
 15190 GAS PIPING SYSTEMS  
 15261 VARIABLE FREQUENCY DRIVE SYSTEMS

15400 PLUMBING, GENERAL PURPOSE  
15556 FORCED HOT WATER HEATING SYSTEMS  
15569 GAS FIRED HOT WATER BOILERS; UP TO 20 MBTUH  
15645 LOW PROFILE, CLOSED LOOP, EVAPORATIVE COOLING TOWER  
15700 INDOOR WATER SOURCE HEAT PUMP; ROOF MOUNTED PACKAGED WATER SOURCE  
HEAT PUMP AND AIR COOLED SPLIT SYSTEM  
15701 ROOF MOUNTED, ENERGY RECOVERY UNIT WITH WATER SOURCE HEAT PUMP  
SECTION (ERU)  
15768 ELECTRIC SPACE HEATING EQUIPMENT  
15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM  
15951 DIRECT DIGITAL CONTROL FOR HVAC  
15990 HVAC TESTING/ADJUSTING/BALANCING  
15995 COMMISSIONING OF HVAC SYSTEMS

## DIVISION 16 - ELECTRICAL

16375 ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND  
16403 MOTOR CONTROL CENTERS, SWITCHBOARDS AND PANELBOARDS  
16415 ELECTRICAL WORK, INTERIOR  
16528 EXTERIOR LIGHTING  
16530 LIGHTING CONTROLS  
16535 DIMMING CONTROLS  
16620 SECURITY SYSTEM  
16730 CLOCK SYSTEM  
16770 SOUND AND COMMUNICATION SYSTEMS  
16775 CAFETERIA AND GYMNASIUM SOUND SYSTEMS  
16900 TELECOM PROJECT SUMMARY/OVERVIEW  
16901 BASIC COMMUNICATIONS REQUIREMENTS  
16903 TELECOM ADMINISTRATIVE REQUIREMENTS  
16908 TELECOM PROJECT MANAGEMENET AND QUALITY ASSURANCE  
16909 TELECOM TECHNOLOGY DOCUMENTATION  
16910 CABLE PLANT OVERVIEW  
16911 COMMUNICATIONS EQUIPMENT ROOMS  
16913 INTERIOR COMMUNICATION PATHWAYS  
16915 BACKBONE CABLING REQUIREMENTS  
16916 HORIZONTAL CABLING REQUIREMENTS  
16917 CABLE PLANT TESTING, IDENTIFICATION AND ADMINISTRATION  
16919 TELECOM SUPPORT AND WARRANTY  
16940 VIDEO DISTRIBUTION OVERVIEW  
16947 VIDEO/AUDIO SYSTEMS TESTING, IDENTIFICATION AND ADMINISTRATION  
16949 SUPPORT AND WARRANTY

-- End of Project Table of Contents --



## SECTION 02115A

## UNDERGROUND STORAGE TANK REMOVAL

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referenced in the text by basic designation only.

## AMERICAN PETROLEUM INSTITUTE (API)

API RP 1604	(1996) Closure of Underground Petroleum Storage Tanks
API RP 2003	(1998) Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents
API Std 2015	(1994) Safe Entry and Cleaning of Petroleum Storage Tanks

## U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 279	Standards for the Management of Used Oil
40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

#### SD-03 Product Data

##### Work Plan; G AE

The Work Plan within 30 days after notice to proceed. The Contractor shall allow 30 days in the schedule for the Government's review and approval. No adjustment for time or money will be made for resubmittals required as a result of noncompliance.

##### Qualifications; G AR

A document indicating that the Contractor meets the specified requirements.

##### Salvage Rights.

A record of the disposition of salvaged materials at the end of the contract.

#### SD-06 Test Reports

##### Backfill Material; G AR

##### Tank Contents Verification; G AR

##### Soil Examination, Testing, and Analysis; G AR

Reports including the chain-of-custody records.

##### Backfilling; G AR

Copies of all laboratory and field test reports.

##### Tank Closure Report; G AR

3 copies of the report for each UST site opened, prepared in a standard 3-ring binder, within 14 days of completing work at each site. Each binder shall be labeled with contract number, project name, location and tank number; each binder shall be indexed. A copy of the report shall be furnished to the Installation Environmental Coordinator.

### 1.3 QUALIFICATIONS

The Contractor shall have a minimum of 2 years of tank removal experience and shall be certified by the District of Columbia for tank removal work.

#### 1.3.1 Laboratory Services

For laboratory services the Contractor shall be validated in accordance

with state certification requirements.

#### 1.3.2 Support Staff

The Contractor shall identify all staff involved for the various components, including personnel collecting and shipping samples. The qualifications of these staff members shall be detailed by the Contractor.

### 1.4 REGULATORY REQUIREMENTS

#### 1.4.1 Permits and Licenses

The Contractor, as required or as directed by the Contracting Officer, shall obtain local, state, or federal permits and licenses that directly impact the Contractor's ability to perform the work prior to commencing removal operations.

#### 1.4.2 Statutes and Regulations

Tank closures shall be carried out in accordance with 40 CFR 280, 40 CFR 262, 40 CFR 264, and 40 CFR 265 as well as the applicable District of Columbia regulations. Hazardous material shall be transported in accordance these regulations.

### 1.5 PROJECT/SITE CONDITIONS

The work shall consist of removal, decontamination and disposal of one, 10,000 gallon underground storage tank and associated piping and ancillary equipment. The tank is constructed of steel and is at the location shown on the drawings. The 10,000 gallon tank was used for storing fuel oil. Residue remaining in the tank is considered a hazardous waste. Subsurface conditions are represented on drawings. Existing native soils are predominantly fill soil of dense silty sand and silty clay. Groundwater has been encountered within 10 feet of the surface. The Contractor shall verify the actual conditions prior to submitting a bid. The site is not a hazardous waste site but shall be given special consideration due to the nature of the materials and hazards present until closure activities are complete.

#### 1.5.1 Sequencing and Scheduling

The Contractor shall notify the Installation Environmental Coordinator and the Contracting Officer seven days prior to tank removal. The Contractor shall be responsible for contacting the Implementation Agency (IA) in accordance with the applicable reporting requirements.

#### 1.5.2 Work Plan

The Contractor shall develop, implement, maintain, and supervise as part of the work, a comprehensive plan for tank removal and related operations. As a minimum the plan shall include, but not be limited to, excavation, removal, and ultimate disposal of the tank, its contents, and any contaminated materials. The Work Plan shall be based on work experience, on the requirements of this specification, and on the following references:

- a. API RP 1604.
- b. API Std 2015.
- c. API RP 2003.

No work at the site, with the exception of site inspections and mobilization, shall be performed until the Work Plan is approved. At a minimum, the Work Plan shall include:

- a. Discussion of the removal approach, tank cleaning, and tank cutting procedures.
- b. Methods to be employed for product, sludge, vapor, and pumpable liquid removal; purging and inerting; and storage methods proposed for control of surface water.
- c. Treatment options.
- d. Identification of waste, tank and contaminated soil transporters and means of transportation.
- e. Treatment, disposal, and alternate facilities, and means of treatment, disposal or remediation.
- f. Borrow source.
- g. Spill prevention plan.
- h. Spill contingency plan.
- i. Decontamination procedures, shoring plan, and safety measures in accordance with Section 01060 "SAFETY".

## PART 2 PRODUCTS

### 2.1 BACKFILL MATERIAL

Backfill material shall be obtained in accordance with Section 02315. Non-contaminated material removed from the excavation shall be used for backfill in accordance with Paragraph BACKFILLING.

## PART 3 EXECUTION

### 3.1 GENERAL REQUIREMENTS

#### 3.1.1 Safety Guidelines

Personnel shall abide by the safety guidelines specified in Section 01060, "SAFETY".

#### 3.1.2 Burning and Explosives

Use of explosives or burning debris will not be allowed.

### 3.1.3 Shoring

Shoring requirements shall be provided in accordance with Section 01060, "SAFETY".

## 3.2 TANK CONTENTS VERIFICATION

Sampling and analysis shall be conducted in accordance with the approved Sampling and Analysis Plan.

### 3.2.1 Sampling

Tank product, pumpable liquids, tank coatings and sludge shall be sampled by the Contractor. If the data is not adequate, additional sampling and analysis to the extent required by the approved off-site facility receiving the material shall be the responsibility of the Contractor. Meeting all regulatory requirements, including the preparation of hazardous materials and waste for transportation shall be the responsibility of the Contractor.

### 3.2.2 Analysis

Tank contents shall be tested by the Contractor for the parameters listed herein. Analyses shall include total petroleum hydrocarbons (TPH).

### 3.2.3 Characterization

Prior to removing any of the tank contents, the contents shall be characterized to determine if the tank contents must be disposed as a hazardous waste based on local, state, and Federal disposal regulations. Tank product, pumpable liquids, and sludge shall be characterized in accordance with 40 CFR 261 and 40 CFR 279. The waste contents determination and accompanying test results for each phase present in the tank shall be submitted to the Contracting Officer. The Contractor shall be responsible for any additional requirements identified by the disposal facility. The tank contents shall not be removed until approval is given by the Contracting Officer.

## 3.3 TOPSOIL

Topsoil shall meet the requirements in Section 02300A EARTHWORK. All areas disturbed by tank removal operations, other than areas to receive pavement or similar surface under this contract, shall be topsoiled.

## 3.4 PREPARATIONS FOR EXCAVATION

Before excavating, the Contractor shall remove all product from the tank; and the tank shall be purged and vented in accordance with API RP 1604, and as specified herein.

### 3.4.1 Removal of Product, Pumpable Liquids, and Sludge

Tank product, pumpable liquids, and sludge shall be removed and disposed of

by the Contractor. No Government facilities shall be used for permanent storage or disposal of the wastes. Usable product shall be the property of the Contractor. The Contractor shall provide approved containers, vehicles, equipment, labor, signs, labels, placards and manifests and associated land disposal restriction notices and notifications, necessary for accomplishment of the work, including materials necessary for cleaning up spills that could occur from tank removal operations.

#### 3.4.2 Contaminated Water Disposal

##### 3.4.2.1 Sampling, Analysis, and Containmentment

Contaminated water shall be sampled and analyzed both prior to and after treatment. Sampling and analysis shall be performed prior to disposal for every 50,000 gallons of contaminated water treated. The Contractor shall provide approved containers, vehicles, equipment, labor, signs, labels, placards and manifests and associated land disposal notices and notifications, necessary for accomplishment of the work.

##### 3.4.2.2 Treatment

Contaminated water shall be treated onsite by oil water separation or other means as approved by the Contracting Officer. If contaminated water is to be treated onsite, the proposed treatment shall be specified in the Work Plan and submitted for approval. Temporary storage and treatment equipment shall be installed at a location approved by the Contracting Officer. Treated effluent shall be sampled and analyzed and the results approved by the Contracting Officer before discharge to the surface. Effluent shall be treated and discharged in accordance with the discharge permit.

#### 3.5 PURGING AND INERTING

After the tank and piping contents have been removed, but prior to excavation beyond the top of the tank, the Contractor shall disconnect all the piping (except the piping needed to purge or inert the tank). Flammable and toxic vapors shall be purged from the tank or the tank made inert in accordance with API RP 1604, with the exceptions that filling with water shall not be used and, if dry ice is employed, the Contractor shall use a minimum of 3 pounds per 100 gallons of tank volume. The tank atmosphere shall be continuously monitored for combustible vapors if the tank is purged, or continuously monitored for oxygen if the tank is inerted.

#### 3.6 EXCAVATION

Excavation areas, as well as work near roadways, shall be marked in accordance with Section 01060 "SAFETY".

##### 3.6.1 Exploratory Trenches

Exploratory trenches shall be excavated as necessary to determine the tank location, limits and the location of ancillary equipment.

##### 3.6.2 Tank Excavation

Excavation around the perimeter of the tank shall be performed limiting the amount of potentially petroleum contaminated soil that could be mixed with previously uncontaminated soil. Petroleum contaminated soil shall be segregated in separate stockpiles. The Contractor shall maintain around the tank an excavation of sufficient size to allow workers ample room to complete the work, but also protect the workers from sliding or cave-ins. Sheet piling, bracing, or shoring shall be installed in the absence of adequate side slopes if there is a need for workers to enter the excavated area. Surface water shall be diverted to prevent direct entry into the excavation. Dewatering of the excavation may require a discharge permit by the State and shall be limited to allow adequate access to the tank and piping, to assure a safe excavation, and to ensure that compaction and moisture requirements are met during backfilling. Dewatering may result in the production of petroleum contaminated water and/or free product. Free product shall be recovered from the groundwater only as part of necessary dewatering.

#### 3.6.3 Piping Excavation

Excavation shall be performed as necessary to remove tank piping and ancillary equipment in accordance with paragraphs: Shoring, Tank Excavation, and Open Excavations.

#### 3.6.4 Open Excavations

Open excavations and stockpile areas shall be secured while awaiting confirmation test results from the soil beneath the tank. The excavation shall be backfilled as soon as possible after tank and contaminated soil removals have been completed and confirmation samples have been taken. The Contractor shall divert surface water around excavations to prevent water from directly entering into the excavation.

#### 3.6.5 Stockpiles

Uncontaminated excavated soil and petroleum contaminated soil that is not a state-regulated hazardous waste shall be disposed of off-site. Excavated material that is regulated by the state as a hazardous waste and which has an obvious petroleum odor as required by the District of Columbia shall be considered contaminated and shall be placed in containers such as drums, roll-offs or dumpsters for sampling in accordance with paragraph Stockpiled Material Sampling. Uncontaminated soil shall be stockpiled separately from the contaminated soil, a safe distance away from, but adjacent to, the excavation. The container cover shall prevent rain or surface water from coming into contact with the contaminated soil, as well as limit the escape of the volatile constituents in the container.

### 3.7 REMOVAL OF PIPING, ANCILLARY EQUIPMENT, AND TANK

#### 3.7.1 Piping and Ancillary Equipment

All piping and ancillary equipment shall be disconnected from the tank. The piping shall be removed completely (interior and exterior of the tank). All tank ancillary equipment and piping connections shall be capped, except those connections necessary to inert the tank within the excavation zone.

The piping exterior and ancillary equipment shall be cleaned to remove all soil and inspected for signs of corrosion and leakage. The Contractor shall ensure no spillage of the piping contents occurs, as specified in the Work Plan, and as required in paragraph SPILLS. If the soil under and around the tank pad is contaminated, the tank pad shall be removed and disposed of off-site at an approved hazardous waste facility.

### 3.7.2 Tank

The tank shall be removed from the excavation and the exterior cleaned to remove all soil and inspected for signs of corrosion, structural damage, or leakage. All materials coming into contact with the tank, or in the vicinity of the excavation such as shovels, slings and tools shall be of the non-sparking type. After removal from the excavation, the tank shall be placed on a level surface at an approved location and secured with wood blocks to prevent movement.

### 3.7.3 Contaminated Soil, Tank and Piping Excavation Examination

After the tank has been removed from the ground, the adjacent and underlying soil shall be examined for any evidence of leakage. The soil shall be visually inspected for staining after removal of all obviously contaminated soil, then screened for the presence of volatile and/or semi-volatile contamination using a real time vapor monitoring instrument. Uncontaminated soil or petroleum contaminated soil not regulated by the state as hazardous waste shall be transported off-site for disposal. Contaminated soil or suspected contaminated soil shall be containerized. The Contracting Officer shall determine the extent of the contaminated soil to be removed from each site. The Contractor shall report any evidence indicating that the amount of contaminated soil may exceed the individual site limit specified, to the Contracting Officer the same day it is discovered. If minimal additional excavation is required, the Contracting Officer may allow the Contractor to proceed. If extensive contamination is encountered, the excavation shall be sampled and backfilled in accordance with paragraph BACKFILLING. After the known contaminated soil is removed, the excavation shall be sampled and analyzed.

## 3.8 TANK CLEANING

### 3.8.1 Exterior

Soil shall be removed from the exterior of the tank, piping, and associated equipment to eliminate soil deposition on roadways during transportation to a temporary storage area, ensure markings will adhere to the surfaces, and simplify tank cutting. Soil shall be removed using non-sparking tools. Soil believed to be contaminated shall be removed and containerized.

### 3.8.2 Temporary Storage

If the tank is stored after the tank exterior is cleaned and ancillary equipment is removed, and prior to being cut into sections, the tank shall be labeled as directed in API RP 1604, placed on blocks, and temporarily stored in the area of the existing tank site. Prior to cleaning the tank interior the tank atmosphere shall be monitored for combustible vapors and



purged or inerted if combustible vapors are detected.

### 3.8.3 Interior

The tank interior shall be cleaned using a high pressure (greater than 500 psi), low volume (less than 2 gpm) water spray until all loose scale and sludge is removed, and contamination, in the form of a sheen, is no longer visible in the effluent stream. The interior surfaces of piping shall also be cleaned, to the extent possible, using the same method used for cleaning the tank. Contaminated water generated from interior cleaning operations (of both piping and tank) shall not exceed the following quantities for each UST cleaned:

UST VOLUME (GALLONS)	PERCENT OF UST VOLUME
10,000 or less	5 or 100 gal., whichever is less

All contaminated water resulting from cleaning operations shall be handled in accordance with paragraph Contaminated Water Disposal. Cleaning shall be accomplished eliminating, to the greatest extent possible, the need for personnel to enter the tank. Cleaning shall be done using specially designed tank cleaning equipment which allows the tank to be cleaned prior to cutting into sections without requiring personnel to enter the tank or, if less specialized equipment is used, the tank shall be partially dissected to overcome confined space entry hazards. This work shall be accomplished in accordance with Section 01060 "SAFETY".

## 3.9 SOIL EXAMINATION, TESTING, AND ANALYSIS

### 3.9.1 Tank Excavation Sampling Procedures

After soil known to be contaminated has been removed or after soil excavation is complete, the excavation shall be sampled with procedures, number, location, and methodology in accordance with state regulations. Samples may be obtained from the pits using a backhoe with a Shelby tube attached to the bucket.

### 3.9.2 Stockpiled Material Sampling

Sampling locations, number and specific procedures shall be as required by the District of Columbia and the disposal facility.

### 3.9.3 Analysis

Soil samples from the excavation and stockpiled material shall be tested in accordance with the approved Sampling and Analysis Plan for the following parameters: total petroleum hydrocarbon (TPH) benzene, ethylbenzene, toluene, xylene (BETX) toxicity characteristic leaching procedure (TCLP). Copies of all test results shall be provided to the Contracting Officer.

## 3.10 BACKFILLING

The tank area and any other excavations shall be backfilled as soon as possible after tank and contaminated soil removals have been completed and

confirmation samples have been taken. Contaminated soil removal shall be complete after approval by the Contracting Officer. The excavation shall be dewatered if necessary.

### 3.11 DISPOSAL REQUIREMENTS

#### 3.11.1 Treatment, Disposal, and Recycling

Disposal of hazardous wastes shall be in accordance with all local, State, and Federal solid and hazardous waste laws and regulations; and conditions specified herein. This work shall include all necessary personnel, labor, transportation, packaging, detailed analyses (if required for disposal, manifesting or completing waste profile sheets), equipment, and reports. Product and pumpable liquids removed from the tank shall be recycled to the greatest extent practicable.

#### 3.11.2 Tank and Ancillary Equipment Disposal

After the tank, piping, and ancillary equipment have been removed from the excavation and the tank cleaned, the tank shall be cut into sections with no dimension greater than 5 feet. Tank and piping sections shall be disposed of in a State approved off-site disposal facility. The tank shall be cut into sections prior to being taken from the tank removal site. The Contractor shall not sell the tank intact. Ancillary equipment shall be disposed of at an approved off-site disposal facility. Piping shall be disconnected from the tank and removed.

#### 3.11.3 Transportation of Wastes

Transportation shall be provided in accordance with Department of Transportation (DOT) Hazardous Material Regulations and State and local requirements, including obtaining all necessary permits, licenses, and approvals. Evidence that a State licensed hazardous waste transporter is being used shall be included in the SUBMITTALS.

#### 3.11.4 Salvage Rights

The Contractor shall retain the rights to salvage value of recycled or reclaimed product and metal not turned in to the DRMO or otherwise identified, so long as the requirements of 40 CFR 266 and 40 CFR 279, or the applicable State requirements are met. At the end of the contract, the Contractor shall provide documentation on the disposition of salvaged materials.

#### 3.11.5 Records

Records shall be maintained of all waste determinations, including appropriate results of analyses performed, substances and sample location, the time of collection, and other pertinent data as required by 40 CFR 280, Section 74 and 40 CFR 262 Subpart D. Transportation, treatment, disposal methods and dates, the quantities of waste, the names and addresses of each transporter and the disposal or reclamation facility, shall also be recorded and available for inspection, as well as copies of the following documents:

- a. Manifests.
- b. Waste analyses or waste profile sheets.
- c. Certifications of final treatment/disposal signed by the responsible disposal facility official.
- d. Land disposal notification records required under 40 CFR 268 for hazardous wastes.

#### 3.11.6 Documentation of Treatment or Disposal

The wastes, other than recyclable or reclaimable product or metal, shall be taken to a treatment, storage, or disposal facility which has EPA or appropriate state permits and hazardous waste identification numbers and complies with the provisions of the disposal regulations. The original return copy of the hazardous waste manifest, signed by the owner or operator of a facility legally permitted to treat or dispose of those materials shall be furnished to the Contracting Officer not later than 5 working days following the delivery of those materials to the facility; and a copy shall be included in the Tank Closure Report. A statement of agreement from the proposed treatment, storage or disposal facility and certified transporters to accept hazardous wastes shall be furnished to the Contracting Officer not less than 14 days before transporting any wastes. If the Contractor selects a different facility than is identified in the Work Plan, documentation shall be provided for approval to certify that the facility is authorized and meets the standards specified in 40 CFR 264.

#### 3.12 SPILLS

Immediate containment actions shall be taken as necessary to minimize effect of any spill or leak. Cleanup shall be in accordance with applicable Federal, State, local laws and regulations, and district policy at no additional cost to the Government.

#### 3.13 TANK CLOSURE REPORT

Tank Closure Reports shall include the following information as a minimum:

- a. A cover letter signed by a licensed company official District of Columbia certifying that all services involved have been performed in accordance with the terms and conditions of this specification.
- b. A narrative report describing what was encountered at each site, including:
  - (1) condition of the UST.
  - (2) any visible evidence of leaks or stained soils.
  - (3) results of vapor monitoring readings.
  - (4) actions taken including quantities of materials treated or

removed.

(5) reasons for selecting sample locations.

(6) sample locations.

(7) collection data such as time of collection and method of preservation.

(8) reasons for backfilling site.

(9) whether or not groundwater was encountered.

c. Copies of all analyses performed for disposal.

d. Copies of all waste analyses or waste profile sheets.

e. Copies of all certifications of final disposal signed by the responsible disposal installation official.

-- End of Section --

CONTRACT NO.

Neval Thomas Elementary School - Final 100%

CONTRACTOR

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## SECTION 16403

## MOTOR CONTROL CENTERS, SWITCHBOARDS AND PANELBOARDS

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- |            |   |
|------------|---|
| ASTM B 187 | (1994) Copper Bar, Bus Bar, Rod and Shapes  |
| ASTM B 317 | (1992a) Aluminum-Alloy Extruded Bar, Rod, Tube, Pipe, and Structural Shapes for Electrical Purposes (Bus Conductor) |

## ASME INTERNATIONAL (ASME)

- |              |  |
|--------------|--|
| ASME B1.1    | (1989) Unified Inch Screw Threads (UN and UNR Thread Form) |
| ASME B1.20.1 | (1983; R 1992) Pipe Threads, General Purpose (Inch)        |

## INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

- |             |  |
|-------------|--|
| IEEE C62.41 | (1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits |
|-------------|--|

## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- |            |   |
|------------|---|
| NEMA AB 1  | (1993) Molded Case Circuit Breakers and Molded Case Switches  |
| NEMA ICS 1 | (1993) Industrial Control and Systems                         |
| NEMA ICS 2 | (1993) Industrial Control Devices, Controllers and Assemblies |
| NEMA ICS 4 | (1993) Industrial Control and Systems Terminal Blocks         |
| NEMA ICS 6 | (1993) Industrial Control and Systems Enclosures              |
| NEMA PB 1  | (1990) Panelboards  |

NEMA PB 2	(1989) Deadfront Distribution Switchboards
NEMA ST 1	(1988) Specialty Transformers (Except General Purpose Type)

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1996) National Electrical Code as referenced by the DC Electrical Code
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## UNDERWRITERS LABORATORIES (UL)

UL 44	(1991; Rev thru Jan 1995) Rubber- Insulated Wires and Cables
UL 50	(1996; Rev thru Oct 1997) Enclosures for Electrical Equipment
UL 67	(1993; Rev thru Nov 1995) Panelboards
UL 489	(1996; Rev thru Nov 1997) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures
UL 845	(1995) Motor Control Centers
UL 891	(1994; Rev thru Jan 1995) Dead-Front Switchboards
UL 943	(1993; Rev thru Mar 1997) Ground-Fault Circuit-Interrupters
UL 1063	(1993; Rev thru Oct 1994) Machine-Tool Wires and Cables
UL 1449	(1985; Errata Apr 1986; Rev May 1995) Transient Voltage Surge Suppressors

## 1.2 SYSTEM DESCRIPTION

These specifications include the design, fabrication, assembly, wiring, testing, and delivery of the items of equipment and accessories and spare parts listed in the Schedule and shown on the drawings.

## 1.2.1 Rules

The equipment shall conform to the requirements of NFPA 70 unless more stringent requirements are indicated herein or shown. NEMA rated and UL listed equipment has been specified when available. Equipment must meet NEMA and UL construction and rating requirements as specified. No equivalent will be acceptable. The contractor shall immediately notify the Contracting Officer of any requirements of the specifications or contractor proposed materials or assemblies that do not comply with UL or NEMA. International Electrotechnical Commission (IEC) rated equipment will not be

considered an acceptable alternative to specified NEMA ratings.

#### 1.2.2 Coordination

The general arrangement of the motor control centers, switchboards and panelboards is shown on the contract drawings. Any modifications of the equipment arrangement or device requirements as shown on the drawings shall be subject to the approval of the Contracting Officer. If any conflicts occur necessitating departures from the drawings, details of and reasons for departures shall be submitted and approved prior to implementing any change. All equipment shall be completely assembled at the factory. The motor control centers and switchboard may be disassembled into sections, if necessary, for convenience of handling, shipping, and installation.

#### 1.2.3 Standard Products

Material and equipment shall be standard products of a manufacturer regularly engaged in their manufacture and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. All materials shall conform to the requirements of these specifications. Materials shall be of high quality, free from defects and imperfections, of recent manufacture, and of the classification and grades designated. All materials, supplies, and articles not manufactured by the Contractor shall be the products of other recognized reputable manufacturers. If the Contractor desires for any reason to deviate from the standards designated in these specifications, he shall, after award, submit a statement of the exact nature of the deviation, and shall submit, for the approval of the Contracting Officer, complete specifications for the materials which he proposes to use.

#### 1.2.4 Nameplates

Nameplates shall be as described in Section 16415 ELECTRICAL WORK, INTERIOR.

#### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Motor Control Center; G AE

The Contractor shall, within 30 calendar days after date of award, submit for the approval of the Contracting Officer six (6) copies of electrical equipment drawings. The NEMA Class IIS motor control center drawings shall include a connection diagram with wire designations and schematic diagrams to illustrate operation of associated motor unit controls. An individual wiring diagram for each motor control center shall be submitted. Wiring



diagrams shall be in a form showing physical arrangement of the control center with interconnecting wiring shown by lines or by terminal designations (wireless). A single-line diagram, equipment list and nameplate schedule shall be provided for each motor control center.

Switchboard; G AE Panelboards; G AE

The Contractor shall, within 30 calendar days after date of award, submit for the approval of the Contracting Officer six (6) copies of electrical equipment drawings. A single-line diagram, equipment list and nameplate schedule shall be provided for each switchboard and panelboard.

SD-03 Product Data

SD-07 Certificates

Motor Control Center

The contractor shall submit certification of factory test reports. Certification shall be signed by official authorized to certify on behalf of the manufacturer, attesting that the motor control center meets the specified requirements. The statement must be dated after the award of this contract, must state the Contractors name and address, must name the project and location, and must list the specific requirements which are being certified.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

The equipment shall be shipped as completely assembled and wired as feasible so as to require a minimum of installation work. Each shipping section shall be properly match marked to facilitate reassembly, and shall be provided with removable lifting channels with eye bolts for attachment of crane slings to facilitate lifting and handling. Any relay or other device which cannot withstand the hazards of shipment when mounted in place on the equipment shall be carefully packed and shipped separately. These devices shall be marked with the number of the panel which they are to be mounted on and fully identified. All finished painted surfaces and metal work shall be wrapped suitably or otherwise protected from damage during shipment. All parts shall be prepared for shipment so that slings for handling may be attached readily while the parts are in a transport truck.

#### 1.5 MAINTENANCE

##### 1.5.1 Accessories and Tools

A complete set of accessories and special tools unique to equipment provided and required for erecting, handling, dismantling, testing and maintaining the apparatus shall be furnished by the Contractor.

##### 1.5.2 Spare Parts

Spare parts shall be furnished as specified below. All spare parts shall be of the same material and workmanship, shall meet the same requirements,

and shall be interchangeable with the corresponding original parts furnished.

- a. 2 - Fuses of each type and size.
- b. 2 - Indicating lamp assemblies of each type.
- c. 1 - Control transformer of each type and rating.
- d. 4 - Keys for motor control center door lock.

## PART 2 PRODUCTS

### 2.1 CONNECTIONS

All bolts, studs, machine screws, nuts, and tapped holes shall be in accordance with ASME B1.1. The sizes and threads of all conduit and fittings, tubing and fittings, and connecting equipment shall be in accordance with ASME B1.20.1. All ferrous fasteners shall have rust-resistant finish and all bolts and screws shall be equipped with approved locking devices. Manufacturer's standard threads and construction may be used on small items which, in the opinion of the Contracting Officer, are integrally replaceable, except that threads for external connections to these items shall meet the above requirements.

### 2.2 MOLDED CASE CIRCUIT BREAKERS

Circuit breakers may be installed in switchboard, panelboards, motor control center, combination motor controllers or enclosure.

Molded case circuit breakers shall conform to the applicable requirements of NEMA AB 1 and UL 489. The circuit breakers shall be manually-operated, shall be quick-make, quick-break, common trip type, and shall be of automatic-trip type unless otherwise specified or indicated on the drawings. All poles of each breaker shall be operated simultaneously by means of a common handle. The operating handles shall clearly indicate whether the breakers are in "On," "Off," or "Tripped" position and shall have provisions for padlocking in the "Off" position. Personnel safety line terminal shields shall be provided for each breaker. The circuit breakers shall be products of only one manufacturer, and shall be interchangeable when of the same frame size. Where indicated on the drawings, circuit breakers shall be provided with shunt trip devices. Where indicated on the drawings, circuit breakers shall be provided with bell alarm contacts that close on automatic operation only. The contacts shall be suitable for 125 volts DC and shall reset when the breaker is reset.

#### 2.2.1 Trip Units

Except as otherwise noted, the circuit breakers, of frame sizes and the trip unit ratings as shown on the drawings, shall be provided with combination thermal and instantaneous magnetic or solid state trip units. The Government reserves the right to change the indicated trip ratings, within frame limits, of the trip devices at the time the shop drawings are submitted for approval. The breaker trip units shall be interchangeable

and the instantaneous magnetic trip units shall be adjustable on frame sizes larger than 150 amperes. Nonadjustable instantaneous magnetic trip units shall be set at approximately 10 times the continuous current ratings of the circuit breakers. Solid state trip units shall be installed in main switchboard and where indicated, shall also have adjustable long time pick-up and delay, short time pick-up and delay, and ground fault pick-up and delay.

All electronics shall be self-contained and require no external relaying, power supply, or accessories. Printed circuit cards shall be treated to resist moisture absorption, fungus growth, and signal leakage. All electronics shall be housed in an enclosure which provides protection against arcs, magnetic interference, dust, and other contaminants. Solid-state sensing shall measure true RMS current with error less than one percent on systems with distortions through the 13th harmonic. Peak or average actuating devices are not acceptable. Current sensors shall be torodial construction, encased in a plastic housing filled with epoxy to protect against damage and moisture and shall be integrally mounted on the breaker. Where indicated on the drawings, circuit breaker frames shall be rated for 100 percent continuous duty. Circuit breakers shall have tripping features as shown on the drawings and as described below:

- a. Long-time current pick-up, adjustable from 50 percent to 100 percent of continuous current rating.
- b. Adjustable long-time delay.
- c. Short-time current pick-up, adjustable from 1.5 to 9 times long-time current setting.
- d. Adjustable short-time delay.
- e. Short-time  $I^2 t$  switch.
- f. Instantaneous current pick-up, adjustable from 1.5 to 9 times long-time current setting.
- g. Ground-fault pick-up, adjustable from 20 percent to 60 percent of sensor rating, but not greater than 1200 amperes. Sensing of ground-fault current at the main bonding jumper or ground strap will not be permitted. Zone-selective interlocking shall be provided as shown.
- h. Adjustable ground-fault delay.
- i. Ground-fault  $I^2 t$  switch.
- j. Overload and short-time and ground-fault trip indicators shall be provided.

#### 2.2.2 480-Volt AC Circuits

Circuit breakers for 480-volt or 277/480-volt AC circuits shall be rated 600 volts AC, and shall have an UL listed minimum interrupting capacity as

indicated.

#### 2.2.3 Ground Fault Circuit Interrupters

UL 943. Main circuit breaker in switchboard shall be equipped with ground fault circuit interrupters of ground fault class, interrupting capacity, and voltage and current ratings as indicated. Branch circuit breakers rated 20 amps and 120 volts shall be equipped with ground fault interrupters where indicated.

#### 2.2.4 SWD Circuit Breakers

Circuit breakers rated 15 amperes and intended to switch 277 volts or less fluorescent lighting loads shall be marked "SWD."

#### 2.2.5 HACR Circuit Breakers

Circuit breakers 60 amperes or below, 240 volts, 1-pole or 2-pole, intended to protect multi-motor and combination-load installations involved in heating, air conditioning, and refrigerating equipment shall be marked "Listed HACR Type."

#### 2.2.6 Ratings

Voltage ratings shall be not less than the applicable circuit voltage. The interrupting rating of the circuit breakers shall be at least equal to the available short-circuit current at the line terminals of the circuit breaker and correspond to the UL listed integrated short-circuit current rating specified for the panelboards and switchboards. Molded-case circuit breakers shall have nominal voltage ratings, maximum continuous-current ratings, and maximum short-circuit interrupting ratings in accordance with NEMA AB 1. Ratings shall be coordinated with system X/R ratio. Series listed circuit breakers installation shall not be allowed.

### 2.3 WIRING

All control wire shall be stranded tinned copper switchboard wire with 600-volt flame-retardant insulation Type SIS meeting UL 44 or Type MTW meeting UL 1063, and shall pass the VW-1 flame tests included in those standards. Hinge wire shall have Class K stranding. The minimum size of control wire shall be No. 14 AWG. Power wiring for 480-volt circuits and below shall be of the same type as control wiring and the minimum size shall be No. 12 AWG. Special attention shall be given to wiring and terminal arrangement on the terminal blocks to permit the individual conductors of each external cable to be terminated on adjacent terminal points.

### 2.4 TERMINAL BLOCKS

Control circuit terminal blocks for control wiring shall be molded or fabricated type with barriers, rated not less than 600 volts. The terminals shall be removable binding, fillister or washer head screw type, or of the stud type with contact and locking nuts. The terminals shall be not less than No. 10 in size and shall have sufficient length and space for

connecting at least two indented terminals for 10 AWG conductors to each terminal. The terminal arrangement shall be subject to the approval of the Contracting Officer and not less than four (4) spare terminals or 10 percent, whichever is greater, shall be provided on each block or group of blocks. Modular, pull apart, terminal blocks will be acceptable provided they are of the channel or rail-mounted type. The Contractor shall submit data showing that the proposed alternate will accommodate the specified number of wires, are of adequate current-carrying capacity, and are constructed to assure positive contact between current-carrying parts.

#### 2.4.1 Load Type Terminal Blocks

Load terminal blocks rated not less than 600 volts and of adequate capacity shall be provided for the conductors for NEMA Size 3 and smaller motor controllers and for other power circuits except those for feeder tap units. The terminals shall be of either the stud type with contact nuts and locking nuts or of the removable screw type, having length and space for at least two indented terminals of the size required on the conductors to be terminated. For conductors rated more than 50 amperes, screws shall have hexagonal heads. Conducting parts between connected terminals shall have adequate contact surface and cross-section to operate without overheating. Each connected terminal shall have the circuit designation or wire number placed on or near the terminal in permanent contrasting color.

#### 2.4.2 Marking Strips

White or other light-colored plastic marking strips, fastened by screws to each terminal block, shall be provided for wire designations. The wire numbers shall be made with permanent ink. The marking strips shall be reversible to permit marking both sides, or two marking strips shall be furnished with each block. Marking strips shall accommodate the two sets of wire numbers. Each device to which a connection is made shall be assigned a device designation in accordance with NEMA ICS 1 and each device terminal to which a connection is made shall be marked with a distinct terminal marking corresponding to the wire designation used on the Contractor's schematic and connection diagrams. The wire (terminal point) designations used on the Contractor's wiring diagrams and printed on terminal block marking strips may be according to the Contractor's standard practice; however, additional wire and cable designations for identification of remote (external) circuits shall be provided for the Government's wire designations. Prints of drawings submitted for approval will be so marked and returned to the Contractor for addition of the designations to the terminal strips and tracings, along with any rearrangement of points required.

#### 2.5 MOTOR CONTROL CENTERS

Each motor control center shall be designed for operation on 480-volts ac, 3-phase, 60-Hz system, and the equipment shall conform to all the applicable requirements of NEMA ICS 1, NEMA ICS 2, NEMA ICS 4 and NEMA ICS 6.

Vertical sections and individual units shall be listed and labeled under UL 845 where ever possible. In lieu of the UL listing, certification from any nationally recognized, adequately equipped, testing agency that the individual units and vertical sections have been tested and conform to the

UL requirements of that agency will be acceptable when approved by the Contracting Officer. The motor control center shall be NEMA Class II, Type B or C, motor control centers in accordance with NEMA ICS 2.

#### 2.5.1 Enclosures

Each motor control center shall consist of the required number of vertical sections of 2250 millimeters (90 inches) nominal height, bolted together, with steel channel sills and suitable for mounting against a wall. Vertical section shall be 510 millimeters (20 inches) deep and buses, control wiring, control transformers, small power transformers, terminal blocks, line terminals, cable supports, and clamps shall be accessible from the front. Enclosure shall be NEMA Type 1 gasketed. The control centers shall be fabricated from smooth select steel sheets shaped and reinforced to form rigid free-standing structures. Metal thickness for enclosures shall be not less than specified in NEMA ICS 6 without exception. Vertical edges of sections exposed to view shall be so fabricated and bolted that the joints will not pass a 1.6 millimeter (1/16 inch) gage. Each structure shall be designed for addition of future sections required. Individual compartments shall be isolated from adjacent compartments.

##### 2.5.1.1 Unit Compartments

Each operating unit shall contain equipment as shown on the drawings, mounted in an individual cell. The unit assembly, except main circuit breakers, panelboards and auxiliary control devices, shall be drawout type removed from the front, without rear access or disturbing other units in the control center assembly. All drawout type unit assemblies shall have positive guide rail system to ensure alignment of connection to vertical bus. Units shall be mechanically interlocked with the door to prevent removal while in the energized position. Each removable unit shall have provision for padlocking in a position in which it is disconnected from the vertical bus although not removed from the stationary structure. All ventilating openings shall be provided with corrosion-resistant insect-proof screens on the inside. Bus closing plugs shall be provided for all unused openings in vertical bus barriers.

##### 2.5.1.2 Motor Control Center Doors and Covers

Each unit compartment, including blank compartments for future use, shall be provided with either a flange-formed or a rolled-edge door. Each door shall be mounted on fully-concealed or continuous full-length piano-type hinges and shall be provided with positive fasteners. Door sag shall be prevented by proper alignment of hinges made of sufficiently strong material. The door fastenings shall be so interlocked to prevent opening when the equipment is energized. The external operating handle shall clearly indicate whether the equipment is in an "ON", "OFF" or "TRIPPED" position.

##### 2.5.1.3 Horizontal Wireways

Structure shall have a minimum 300 millimeters (12 inches) high wireway at the top and a 150 millimeters (6 inches) minimum wireway at the bottom. Both horizontal wireways shall run the length of the structure. A master

terminal block compartment with full length wireway space shall be provided at the top in all Type C assemblies. Cover plates shall be provided on the side of the assembly to permit extension of the horizontal bus and wireway when vertical sections are added.

#### 2.5.1.4 Vertical Wireways

Vertical wireways shall be provided in all vertical sections accepting multiple plug-in components. Vertical wireways shall connect with horizontal wireways at the top and bottom and be a minimum 100 millimeters (4 inches) wide. Barriers shall be provided in sections containing both ac and dc vertical buses. Doors shall be provided on each vertical wireway. The exposed surface of any door shall not deviate more than 1.5 millimeters (1/16-inch) from a true plane.

#### 2.5.1.5 Sills

Channel iron foundations, complete with bolts and drilled holes for grouting and anchoring to the floor, shall be furnished for the complete length (front and rear) of each motor control center assembly. The channels shall be designed for flat mounting and maximum channel depth shall be 60 millimeters (2-1/2 inches). Additional channel or substantial metal trim shall be provided flush with the end panels to completely enclose the bases across the ends of the equipment assemblies.

#### 2.5.2 Buses

All buses shall be of copper or aluminum and all bolted splices and connections between buses and for extensions or taps for equipment shall be tin or silver-plated. Copper bars and shapes for bus conductors shall conform to the applicable requirements of ASTM B 187 , and ASTM B 317. All splices for field assembly shall be bolted with at least two bolts and shall employ the use of "Belleville" washers in the connection. The bus ratings shall be based on a 65 degree Celsius maximum temperature rise in accordance with UL 845 requirements. Bus shall have a short-circuit current rating of not less than 42,000 RMS symmetrical amperes. All bus work shall be supported on wet process porcelain insulators, glass polyester, or suitable molded material.

##### 2.5.2.1 Horizontal Bus

Each control center assembly shall be provided with a three-phase main horizontal bus, with a continuous current rating not less than 600 amperes, located across the top of each vertical section. The ends of horizontal buses shall be drilled for future extensions. The main horizontal bus shall be fully insulated.

##### 2.5.2.2 Vertical Bus

Each vertical section shall be provided with a three-phase vertical bus with a continuous current rating of 300 amperes connected to the horizontal bus by brazing, welding, or bolting. Where the incoming feeder breakers are located at the bottom of a control center, the vertical bus in that section shall be rated the same as the main horizontal bus. Vertical buses

shall extend from the horizontal bus to the bottom of the lowest available unit mounting space. The vertical bus shall be isolated from wireways and equipment in compartments.

#### 2.5.2.3 Ground Bus

A copper ground bus shall be provided full width at the bottom of the motor control center line-up. A full clamp-type solderless copper or copper alloy lug for No. 2/0 AWG stranded copper cable shall be provided at each end of the bus for connection to the station grounding system.

#### 2.5.2.4 Neutral Bus

A fully rated neutral bus shall be furnished continuous through the control center. Lugs of appropriate capacity will be furnished.

#### 2.5.3 Combination Starters

Combination motor controller units shall contain switchboard and RK5 fuses, auxiliary and pilot devices and a magnetic contactor with thermal overload relays. The ratings of switches and fuses, contactors, motor controllers and other devices shall be as shown on the drawings. All combination motor controller units shall have short circuit ratings equal to 42,000 or greater. Where control push-buttons, indicating lamps, "Hand-Off-Automatic" switches, and similar control devices are associated with a unit, they shall be mounted on the unit compartment door. Door-mounted components shall not interfere with access within the compartments.

##### 2.5.3.1 Magnetic Contactors

Magnetic contactors shall be of the NEMA sizes indicated on the drawings. The rating, performance and service characteristics shall conform to the requirements of NEMA ICS 2 for contactors with continuous current ratings for the duty indicated. Contactors for motor control shall be rated for full-voltage starting (Class A controllers). Contactors shall be suitable for at least 200,000 complete operations under rated load without more than routine maintenance. The interruption arc and flame shall be minimized by suitable arc chutes or other means so that no damage will be done to other portions of the device. The arc chutes, if provided, shall be easily removable without removing or dismantling other parts. The contacts shall be easily removable. All current-carrying contact surfaces shall be silver-surfaced or of other approved material to prevent the formation of high resistance oxides. The contactor shall operate without chatter or perceptible hum while energized. Coils shall be suitable for continuous operation 120-volt ac circuits. Alternating-current contactors shall be three-pole, except where otherwise noted, and shall be insulated for 600 volts ac and of the electrically-operated, magnetically-held type. Direct-current contactors shall be two-pole, suitable for controlling circuits operating at 125 volts dc, insulated for 250 volts dc, electrically-operated, magnetically-held type and adequate for full-voltage motor starting service.

##### 2.5.3.2 Auxiliary Contacts



Each controller shall be provided with a minimum of three auxiliary contacts which can be easily changed from normally open to normally closed.

Where indicated on the drawings, a fourth auxiliary contact and red and green indicating lights shall be provided.

#### 2.5.3.3 Overload Relays

Except as otherwise indicated, each controller shall be provided three NEMA Class 20 thermal overload relays with external manual reset. Prior to shipment of the control centers, the Contracting Officer will furnish the ratings of the heater elements to be installed in the relays by the Contractor.

#### 2.5.3.4 Individual Control Transformers

Individual control transformer shall be provided on the line side of the unit disconnect. The control transformers shall be rated 480-120 volts and shall conform to the requirements for control transformers in NEMA ST 1. Control transformers shall have adequate volt-ampere capacity for the control functions indicated and an additional 50 percent capacity. Transformers shall be installed with primary fuses. Primary fuses shall be Class J. Except as otherwise indicated on the drawings, each control transformer shall be provided with a fuse in one secondary lead and shall have the other secondary lead grounded.

#### 2.5.3.5 Voltage Fault Protection

Starters shall be provided with protection against phase unbalance, phase loss, phase reversal, undervoltage and overvoltage. Upon sensing one of these faults, the protector shall de-energize the starter. The protector shall use a combination of voltage and phase-angle sensing to detect phase loss even when regenerated voltages are present. The protector shall be connected to the load side of the motor circuit disconnect. The protector shall have an adjustable line voltage trip level, adjustable trip delay, automatic reset and manual reset by an external normally closed push-button, and Double Pull Double Throw (DPDT) output contacts. Protector operation shall have repeatability of +1 percent of set point, maximum, and a dead band of 2 percent maximum. Protector shall have green indicator to show normal status and red indicator to show tripped status. Indicators will be visible through the compartment door, when LED's are used protector shall be covered with a clear unbreakable cover, when lamps are used they shall have nameplates and be grouped with other indicating lights.

#### 2.5.3.6 Control Circuit Disconnects

Control circuit power shall disconnect when the unit compartment is opened.

#### 2.5.4 Ground Detector Indicator

Ground-detector indicator (GDI) shall be rated 120-volts; have three lamps, one per phase, three 480-120 volt transformers connected delta-wye, adjustable loading resistor for balancing capacitive charging current, and push-to test-switch. GDI shall provide visual indication of a single

ground-fault on any phase (A, B, or C) of a three-phase, three-wire ungrounded power system. When no phase is grounded, all lamps shall glow at partial brightness, giving long lamp life, the push-to test switch shall not affect the brightness of any lamp. When a single ground-fault occurs on any phase, the lamp that corresponds to the faulted phase shall be dark and the other two lamps shall glow at full brightness. The push-to-test switch shall cause all lamps to return to partial brightness, showing the GDI is functioning properly.

#### 2.5.5 Wiring for Motor Control Centers

All wiring shall meet the requirements of paragraph WIRING above. Heavy-duty clamp type terminals shall be provided by the Contractor for terminating all power cables entering the control centers.

##### 2.5.5.1 Contractor's Wiring

The Contractor's wiring shall be formed into groups, suitably bound together, properly supported and run straight horizontally or vertically. There shall be no splices in the wiring. The manufacturer's standard pressure-type wire terminations for connections to internal devices will be acceptable. Terminal blocks shall be added for wiring to devices having leads instead of terminals. Ring tongue indented terminals shall be used on all wires terminated on control terminal blocks for external or interpanel connections and at shipping splits. All stud terminals shall have contact nuts and either locking nuts or lockwashers.

##### 2.5.5.2 External Connections

Power and control cables will enter the control centers at the top.

##### 2.5.5.3 Terminal Blocks

Terminal blocks shall meet the requirements of paragraph TERMINAL BLOCKS above. In no case shall the terminals provided for circuit breakers or contactors accommodate less than the number or size of conductors shown on the drawings. Special attention shall be given to wiring and terminal arrangement on the terminal blocks to permit the individual conductors of each external cable to be terminated on adjacent terminal points.

#### 2.5.6 Accessories and Control Devices

Control accessories shall be provided, and shall be suitable for mounting on the front of, or inside, the control centers as indicated on the drawings. Control accessories shall meet the applicable requirements of NEMA ICS 2. Relays and other equipment shall be so mounted that mechanical vibration will not cause false operation.

##### 2.5.6.1 Control Stations

Push-button stations and selector switches shall conform to NEMA ICS 2, shall be of the heavy-duty, oil-tight type, rated 600 volts ac, and have a contact rating designation of A600. Switches shall be provided with escutcheon plates clearly marked to show operating positions. Sufficient

contact blocks shall be provided to make up the electrically separate contacts required for lead-lag selector switches.

#### 2.5.6.2 LED Indicating Lights

Red and green LED's shall be furnished where shown on the drawings, indicating contact "open" and "closed" position. The LED's shall be accessible and replaceable from the front of the control center through a finished opening in the compartment door. The LED assemblies shall be of the heavy duty oiltight, watertight, and dusttight type.

#### 2.5.6.3 Control Relays

Control relays shall be of the electrically operated, magnetically held, self-reset, open type, suitable for mounting inside the starter compartments, and shall be 120-volt ac. Contacts shall be as indicated on the drawings and shall have a contact rating designation of A600 or N600, as required, in accordance with NEMA ICS 2.

### 2.6 SWITCHBOARDS

The switchboard shall be a dead-front switchboard conforming to NEMA PB 2 and labeled under UL 891. The switchboard shall be completely enclosed self-supporting metal structures with the required number of vertical panel sections, buses, molded-case circuit breakers, and other devices as shown on the drawings. Switchboards shall be fully rated for a short-circuit current of 65,000 symmetrical amperes RMS AC as shown on the drawings.

#### 2.6.1 Enclosure

Each switchboard enclosure shall be NEMA type 1, built with selected smooth sheet steel panels of not less than 1.9 millimeters (No. 14 gage). Exposed panels on the front and ends shall have bent angle or channel edges with all corner seams welded and ground smooth. The front outside surfaces shall not be drilled or welded for the purpose of attaching wires or mounting devices if such holes or fastenings will be visible from the front. The front panels shall be made in sections flanged on four sides and attached to the framework by screws and arranged for ready removal for inspection or maintenance. Ventilating openings shall be provided as required and shall preferably be of the grille type. All ventilating openings shall be provided with corrosion-resistant insect-proof screens on the inside. Switchboard shall be mounted as shown on the drawings and mounting materials shall be furnished by the Contractor as indicated.

#### 2.6.2 Bus

All buses shall be of copper and all bolted splices and connections between buses and for extensions or taps for equipment shall be tin or silver-plate throughout. Copper bars and shapes for bus conductors shall conform to the applicable requirements of ASTM B 187, and ASTM B 317. All splices for field assembly shall be bolted with at least two bolts and shall employ the use of "Belleville" washers in the connection. Horizontal and vertical power buses have minimum current ratings as shown on the drawings. The buses shall be insulated for not less than 600 volts. Shop

splices and tap connections shall be brazed, pressure-welded or bolted. All splices for field assembly shall be bolted. The buses shall be mounted on insulating supports of wet process porcelain, glass polyester, or suitable molded material, and shall be braced to withstand not less than 65,000 symmetrical amperes AC as indicated on the drawings.

#### 2.6.3 Grounding Bus

An copper ground bus, rated not less than 2000 amps, extending the entire length of the assembled structure, shall be mounted near the bottom of enclosure. A full clamp-type solderless copper or copper alloy lug for No. 4/0 AWG stranded copper cable shall be provided for connection to other grounding system as shown on the drawing.

#### 2.6.4 Components

Each switchboard shall be equipped with molded-case circuit breakers conforming to paragraph MOLDED CASE CIRCUIT BREAKERS and with frame sizes, trip ratings, and terminal connectors for attachment of outgoing power cables as shown on the drawings. The circuit breakers shall be individually stationary mounted, for the main breakers, and shall be operable and removable from the front. The group-mounted circuit breakers shall be provided complete with bus work in an integrated assembly on the switchboard and shall conform to the applicable requirements of paragraph PANELBOARDS.

#### 2.7 EQUIPMENT FOR ELECTRICITY METERING BY OWNER

Meter: Electronic kilowatt-hour/demand measuring to record electricity used and highest peak demand over a time period according to electric utility. Meter is designed for use on the type and rating of circuit indicated for its application.

1. Kilowatt-Hour Display: Digital liquid crystal.
2. Kilowatt-Demand Display: Digital, liquid-crystal type to register highest peak demand.
3. Enclosure: NEMA 250, Type 1, minimum, with hasp for padlocking or sealing.
4. Memory Back-up: Self-contained to maintain memory throughout power outages of 72 hours, minimum.
5. Sensors: Current-sensing type, with current or voltage output, selected for optimum range and accuracy for the ratings of the circuits indicated for this application. Ammeter range from 0 to indication shall be 2000 amperes. Voltmeter shall be range 0 to 600 volts.
  - a. Type: Solid core.
6. Accuracy: Nationally recognized testing laboratory certified to meet ANSI C12.1 specifications.

7. Demand Signal Communication Interface: Match signal to building automation system input that conveys data on instantaneous/integrated demand level measured by meter used for load switching to control demand. Coordinate with Contracting Officer for building automation system interfacing equipment.

Current-Transformer Cabinets: Listed or recommended by metering equipment manufacturer for use with sensors indicated.

Metering Equipment Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. E-MON Corporation.
2. National Meter Industries, Inc.
3. Osaki Meter Sales, Inc.
4. Approved equal.

## 2.8 TVSS DEVICES

IEEE C62.41, integrally mounted, plug-in style, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules.

Minimum single-impulse current rating shall be as follows:

Line to Neutral: 240,000 amps.

1. Line to Ground: 240,000 amps.
2. Neutral to Ground: 240,000 amps.

Protection modes shall be as follows:

1. Line to neutral.
2. Line to ground.
3. Neutral to ground.

EMI/RFI Noise Attenuation Using 50-ohm Insertion Loss Test: 55 dB at 100 kHz.

Category C combination waveclamping voltage shall not exceed 1,000 volts, line to neutral and line to ground on 277/480 volt systems.

UL 1449 clamping levels shall not exceed 800-volts, line to neutral and line to ground on 277/480 volt systems.

Withstand Capabilities: 3000 Category C surges with less than 5 percent change in clamping voltage.

Accessories shall include the following:

1. Form-C contacts, one normally open and one normally closed, for remote monitoring of system operation. Contacts to reverse position on failure of any surge diversion module.
2. Audible alarm activated on failure of any surge diversion module.

3. Six-digit transient-counter set to totalize transient surges that deviate from the sine-wave envelope by more than 125 volts.

4. 600 volt AC rated, 60 amps, 200 KAIC minimum fused disconnect switch integral to TVSS.

## 2.9 PANELBOARDS

Panelboards shall consist of assemblies of molded-case circuit breakers with buses and terminal lugs for the control and protection of branch circuits to motors, heating devices and other equipment operating at 480 volts AC or less. Panelboards shall be UL 67 labeled. "Loadcenter" type panels are not acceptable. Panelboards shall be designed for installation in surface-mounted or flush-mounted cabinets accessible from the front only, as shown on the drawings. Panelboards shall be fully rated for a short-circuit current as indicated on the drawings. Series listed circuit breakers shall not be acceptable.

### 2.9.1 Enclosure

Enclosures shall meet the requirements of UL 50. All cabinets shall be fabricated from sheet steel of not less than No. 10 gage if flush-mounted or mounted outdoors, and not less than No. 12 gage if surface-mounted indoors, with full seam-welded box ends. Flush-mounted shall be hot-dipped galvanized after fabrication. Front edges of cabinets shall be form-flanged or fitted with structural shapes welded or riveted to the sheet steel, for supporting the panelboard front. All cabinets shall be so fabricated that no part of any surface on the finished cabinet shall deviate from a true plane by more than 1/8 inch. Holes shall be provided in the back of indoor surface-mounted cabinets, with outside spacers and inside stiffeners, for mounting the cabinets with a 1/2 inch clear space between the back of the cabinet and the wall surface. Flush doors shall be mounted on hinges that expose only the hinge roll to view when the door is closed. Each door shall be fitted with a combined catch and lock, except that doors over 24 inches long shall be provided with a three-point latch having a knob with a T-handle, and a cylinder lock. Two keys shall be provided with each lock, and all locks shall be keyed alike. Finished-head cap screws shall be provided for mounting the panelboard fronts on the cabinets. Enclosure shall have nameplates in accordance with paragraph NAMEPLATES. Directory holders, containing a neatly typed or printed directory under a transparent cover, shall be provided on the inside of panelboard doors.

### 2.9.2 Buses

All panelboards shall be of the dead-front type with buses and circuit breakers mounted on a plate or base for installation as a unit in a cabinet. All buses shall be of copper and shall be tin or silver-plated. Copper bars and shapes for bus conductors shall conform to the applicable requirements of ASTM B 187, and ASTM B 317. The sizes of buses and the details of panelboard construction shall meet or exceed the requirements of NEMA PB 1. Suitable provisions shall be made for mounting the bus within panelboards and adjusting their positions in the cabinets. Terminal lugs

required to accommodate the conductor sizes shown on the drawing, shall be provided for all branch circuits larger than No. 10 AWG. A grounding lug suitable for 1/0 AWG wire shall be provided for each panelboard.

### 2.9.3 Components

Each branch circuit, and the main buses where so specified or shown on the drawings, shall be equipped with molded-case circuit breakers having overcurrent trip ratings as shown on the drawings. The circuit breakers shall be of a type designed for bolted connection to buses in a panelboard assembly, and shall meet the requirements of paragraph MOLDED CASE CIRCUIT BREAKERS. Circuit breakers of the same frame size and rating shall be interchangeable.

### 2.10 TVSS PANELBOARDS

Doors: Front mounted; secured with vault-type latch with tumbler lock; keyed alike. Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

Main Overcurrent Devices: Thermal-magnetic circuit breaker.

Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

Bus: Copper phase and neutral buses; 200-percent capacity neutral bus.

TVSS Device: IEEE C62.41, integrally mounted, plug-in-style, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules.

1. Minimum single-impulse current rating shall be as follows:
  - a. Line to Neutral: 100,000-amps.
  - b. Line to Ground: 100,000-amps.
  - c. Neutral to Ground: 50,000-amps.
2. Protection modes shall be as follows:
  - a. Line to neutral.
  - b. Line to ground.
  - c. Neutral to ground.
3. EMI/RFI Noise Attenuation Using 50-ohm Insertion Loss Test: 55 dB at 100 kHz.
4. UL 1449 clamping levels shall not exceed 400 volts, line to neutral and line to ground on 120/208 volts systems.
5. Withstand Capabilities: 3000 Category C surges with less than 5-percent change in clamping voltage.
6. Accessories shall include the following:
  - a. Form-C contacts, one normally open and one normally closed, for remote monitoring of system operation. Contacts to reverse

position on failure of any surge diversion module.

b. Audible alarm activated on failure of any surge diversion module.

c. Six-digit transient-counter set to total transient surges that deviate from the sine-wave envelope by more than 125 volts.

## 2.11 SOURCE QUALITY CONTROL

### 2.11.1 Equipment Test Schedule

The Government reserves the right to witness tests. Provide equipment test schedules for tests to be performed at the manufacturer's test facility. Submit required test schedule and location, and notify the Contracting Officer 30 calendar days before scheduled test date. Notify Contracting Officer 15 calendar days in advance of changes to scheduled date.

#### a. Test Instrument Calibration

(1) The manufacturer shall have a calibration program which assures that all applicable test instruments are maintained within rated accuracy.

(2) The accuracy shall be directly traceable to the National Institute of Standards and Technology.

(3) Instrument calibration frequency schedule shall not exceed 12 months for both test floor instruments and leased specialty equipment.

(4) Dated calibration labels shall be visible on all test equipment.

(5) Calibrating standard shall be of higher accuracy than that of the instrument tested.

(6) Keep up-to-date records that indicate dates and test results of instruments calibrated or tested. For instruments calibrated by the manufacturer on a routine basis, in lieu of third party calibration, include the following:

(a) Maintain up-to-date instrument calibration instructions and procedures for each test instrument.

(b) Identify the third party/laboratory calibrated instrument to verify that calibrating standard is met.

### 2.11.2 Switchboard Design Tests

NEMA PB 2 and UL

#### 2.11.2.1 Design Tests

Furnish documentation showing the results of design tests on a product of the same series and rating as that provided by this specification.



- a. Short-circuit current test
- b. Enclosure tests
- c. Dielectric test

#### 2.11.3 Switchboard Production Tests

NEMA PB 2 and UL 891. Furnish reports which include results of production tests performed on the actual equipment for this project. These tests include:

- a. 60-hertz dielectric tests
- b. Mechanical operation tests
- c. Electrical operation and control wiring tests

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

#### 3.2 INSTALLATION OF EQUIPMENT AND ASSEMBLIES

Install and connect equipment furnished under this section as indicated on project drawings, the approved shop drawings, and as specified herein

##### 3.2.1 Switchboard

NEMA PB 2.1.

##### 3.2.2 Meters and Instrument Transformers

NEMA C12.1.

##### 3.2.3 Galvanizing Repair

Repair damage to galvanized coatings using ASTM A 780, zinc rich paint, for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces that repair paint has been applied to.

#### 3.3 FOUNDATION FOR EQUIPMENT AND ASSEMBLIES

##### 3.3.1 Interior Location

Mount switchboard on concrete slab. Unless otherwise indicated, the slab shall be at least 4 inches thick. The top of the concrete slab shall be approximately 4 inches above finished floor. Edges above floor shall have 1/2 inch chamfer. The slab shall be of adequate size to project at least 8 inches beyond the equipment. Provide conduit turnups and cable entrance

space required by the equipment to be mounted. Seal voids around conduit openings in slab with water- and oil-resistant caulking or sealant. Cut off and bush conduits above slab surface as required by PEPCO.

### 3.4 FIELD QUALITY CONTROL

Contractor shall submit request for settings of breakers to the Contracting Officer after approval of switchboard and at least 30 days in advance of their requirement.

#### 3.4.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

##### 3.4.1.1 Switchboard Assemblies

###### a. Visual and Mechanical Inspection

- (1) Compare equipment nameplate data with specifications and approved shop drawings.
- (2) Inspect physical, electrical, and mechanical condition.
- (3) Confirm correct application of manufacturer's recommended lubricants.
- (4) Verify appropriate anchorage, required area clearances, and correct alignment.
- (5) Inspect all doors, panels, and sections for paint, dents, scratches, fit, and missing hardware.
- (6) Verify that fuse and circuit breaker sizes and types correspond to approved shop drawings.
- (7) Verify that current transformer ratios correspond to approved shop drawings.
- (8) Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.
- (9) Confirm correct operation and sequencing of electrical and mechanical interlock systems.
- (10) Clean switchboard.
- (11) Inspect insulators for evidence of physical damage or contaminated surfaces.
- (12) Verify correct barrier and shutter installation and

operation.

(13) Exercise all active components.

(14) Inspect all mechanical indicating devices for correct operation.

(15) Verify that vents are clear.

(16) Test operation, alignment, and penetration of instrument transformer withdrawal disconnects.

(17) Inspect control power transformers.

b. Electrical Tests

(1) Perform insulation-resistance tests on each bus section.

(2) Perform overpotential tests.

(3) Perform insulation-resistance test on control wiring; Do not perform this test on wiring connected to solid-state components.

(4) Perform control wiring performance test

(5) Perform primary current injection tests on the entire current circuit in each section of assembly.

3.4.1.2 Circuit Breakers

Low Voltage Molded Case with Solid State Trips

a. Visual and Mechanical Inspection

(1) Compare nameplate data with specifications and approved shop drawings.

(2) Inspect circuit breaker for correct mounting.

(3) Operate circuit breaker to ensure smooth operation.

(4) Inspect case for cracks or other defects.

(5) Inspect all bolted electrical connections for high resistance using low resistance ohmmeter, verifying tightness of accessible bolted connections and/or cable connections by calibrated torque-wrench method, or performing thermographic survey.

(6) Inspect mechanism contacts and arc chutes in unsealed units.

b. Electrical Tests

(1) Perform contact-resistance tests.

- (2) Perform insulation-resistance tests.
- (3) Perform Breaker adjustments for final settings in accordance with Government provided settings.
- (4) Perform long-time delay time-current characteristic tests.
- (5) Determine short-time pickup and delay by primary current injection.
- (6) Determine ground-fault pickup and time delay by primary current injection.
- (7) Determine instantaneous pickup current by primary injection.
- (8) Verify correct operation of any auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, and anti-pump function.

#### 3.4.1.3 Current Transformers

##### a. Visual and Mechanical Inspection

- (1) Compare equipment nameplate data with specifications and approved shop drawings.
- (2) Inspect physical and mechanical condition.
- (3) Verify correct connection.
- (4) Verify that adequate clearances exist between primary and secondary circuit.
- (5) Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey
- (6) Verify that all required grounding and shorting connections provide good contact.

##### b. Electrical Tests

- (1) Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable.
- (2) Perform insulation-resistance tests.
- (3) Perform polarity tests.
- (4) Perform ratio-verification tests.

#### 3.4.1.4 Metering and Instrumentation

a. Visual and Mechanical Inspection

- (1) Compare equipment nameplate data with specifications and approved shop drawings.
- (2) Inspect physical and mechanical condition.
- (3) Verify tightness of electrical connections.

b. Electrical Tests

- (1) Determine accuracy of meters at 25, 50, 75, and 100 percent of full scale.
- (2) Calibrate watt-hour meters according to manufacturer's published data.
- (3) Verify all instrument multipliers.
- (4) Electrically confirm that current transformer and voltage transformer secondary circuits are intact.

3.4.1.5 Grounding System

Visual and Mechanical Inspection

- (1) Inspect ground system for compliance with contract plans and specifications.

b. Electrical Tests

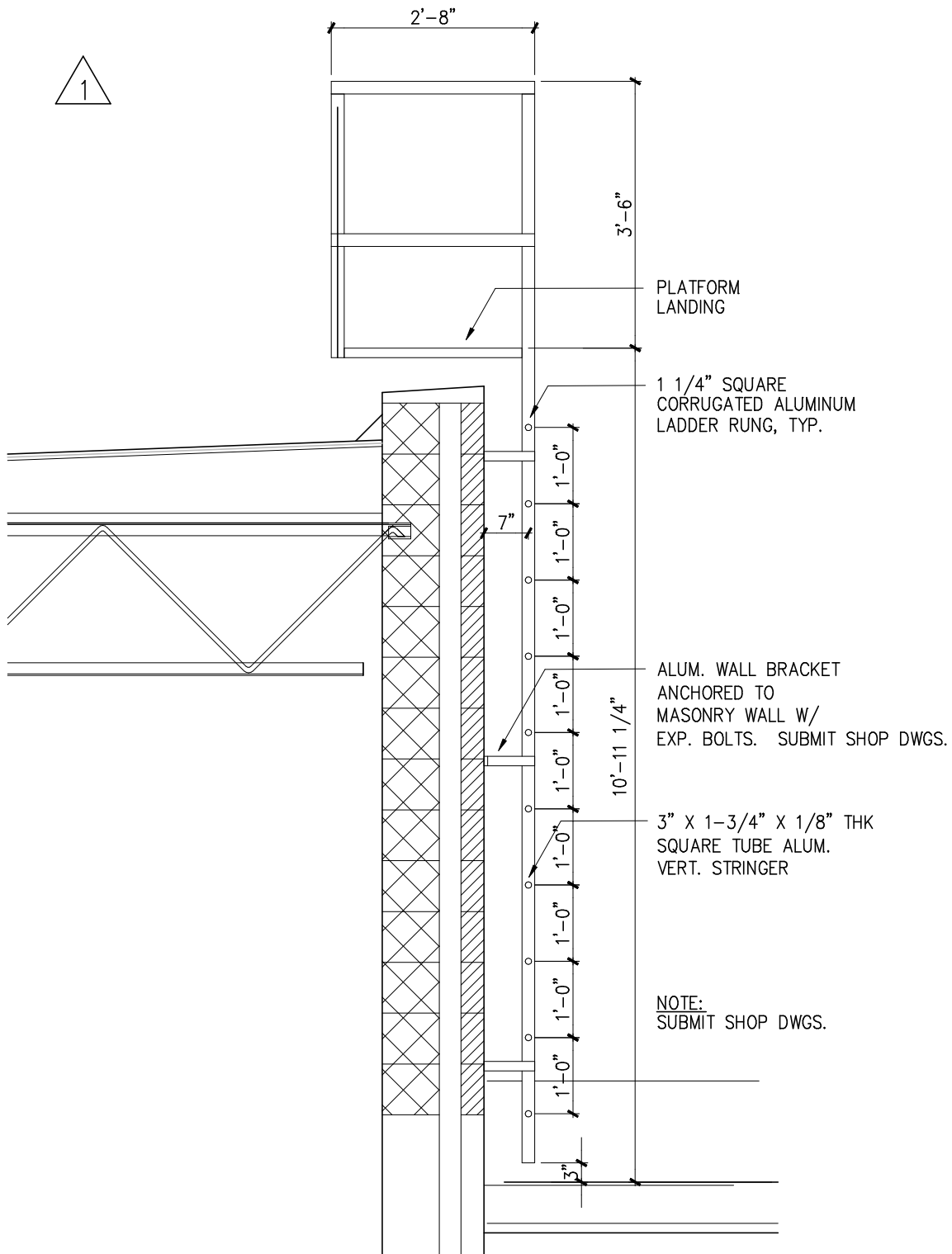
- (1) Perform ground-impedance measurements utilizing the fall-of-potential method. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.
- (2) Submit the measured ground resistance of each ground rod and grounding system, indicating the location of the rod and grounding system. Include the test method and test setup (i.e., pin location) used to determine ground resistance and soil conditions at the time the measurements were made.

3.4.2 Follow-Up Verification

Upon completion of acceptance checks, settings, and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function.

Circuit breakers shall be tripped by operation of each protective device. Test shall require each item to perform its function not less than three times. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times for checks, settings, and tests.

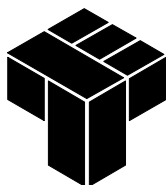
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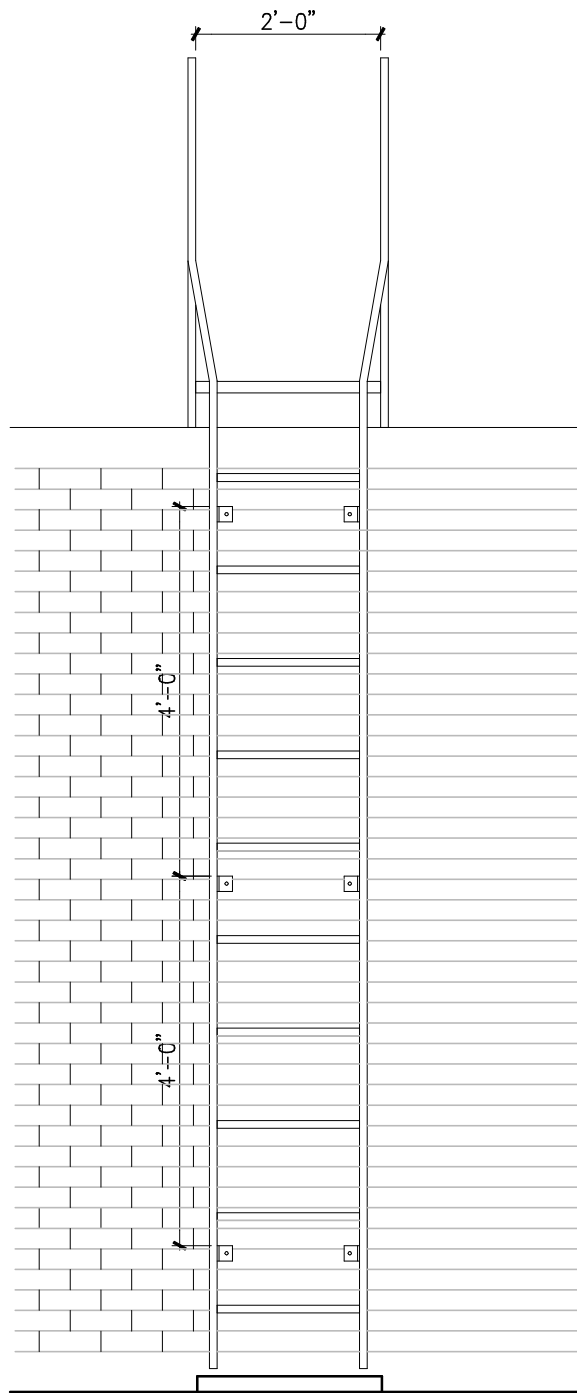
1 AMENDMENT NO. 2, ISSUED 04/21/2003

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Prescott



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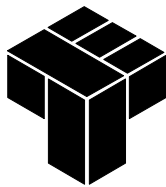
Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: EJ  
WASHINGTON, DC 20019 Drawn by: DC  
Title: EXTERIOR LADDER Checked by: SML  
SECTION Date: 04/21/2003  
Modifies Drawing No.: 3/A504 Scale: 1/2"=1'-0" Drawing No.: ADD-A-01



0' 2' 4' 8' 16' 1/8"=1'-0"

1 AMENDMENT NO. 2, ISSUED 04/21/2003

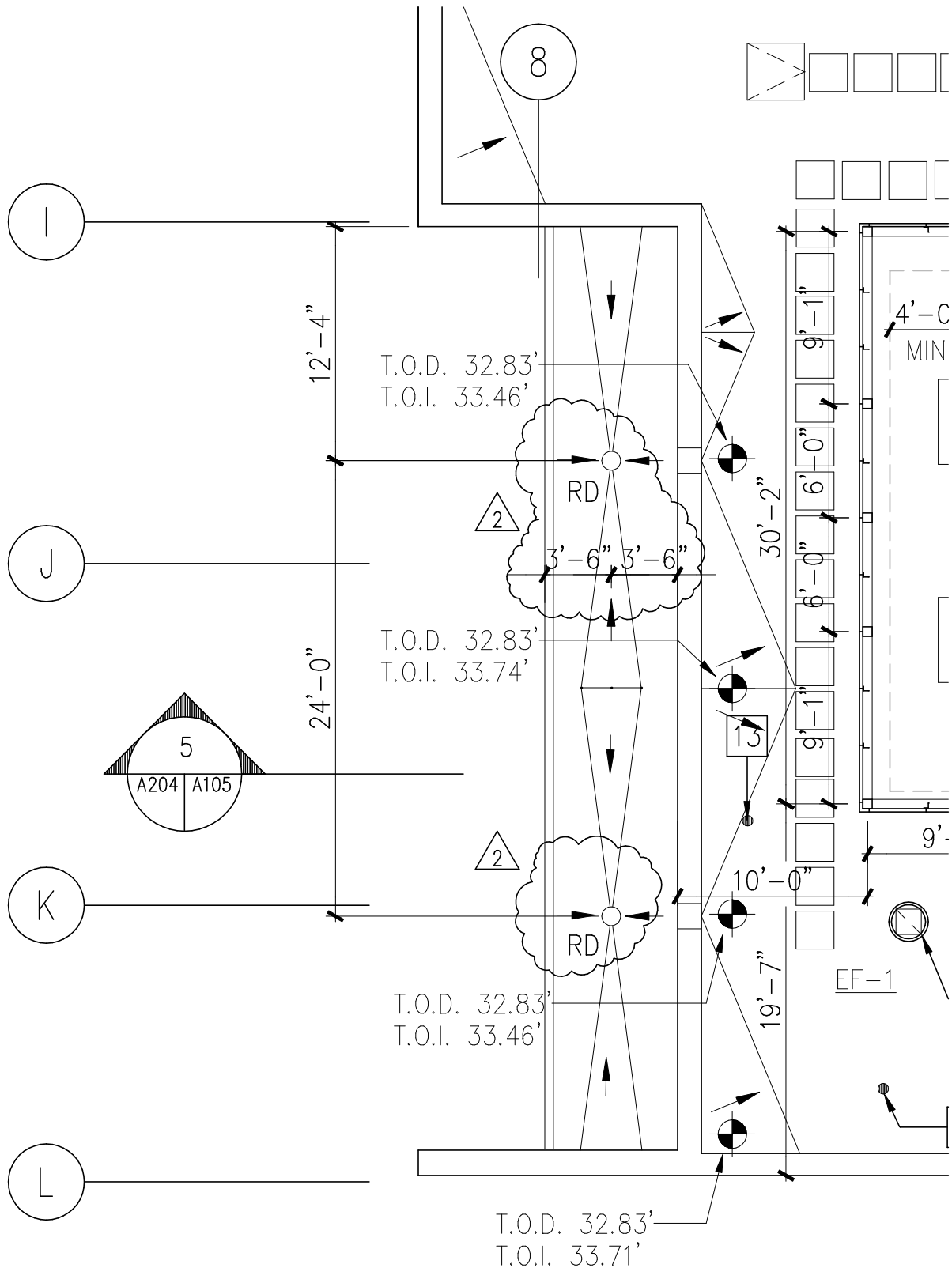
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ENGINEERING, P.C.

Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: EJ  
WASHINGTON, DC 20019 Drawn by: DC  
Title: EXTERIOR LADDER Checked by: SML  
ELEVATION Date: 04/21/2003  
Modifies Drawing No.: 3/A504 Scale: 1/2"=1'-0" Drawing No.: ADD-A-02





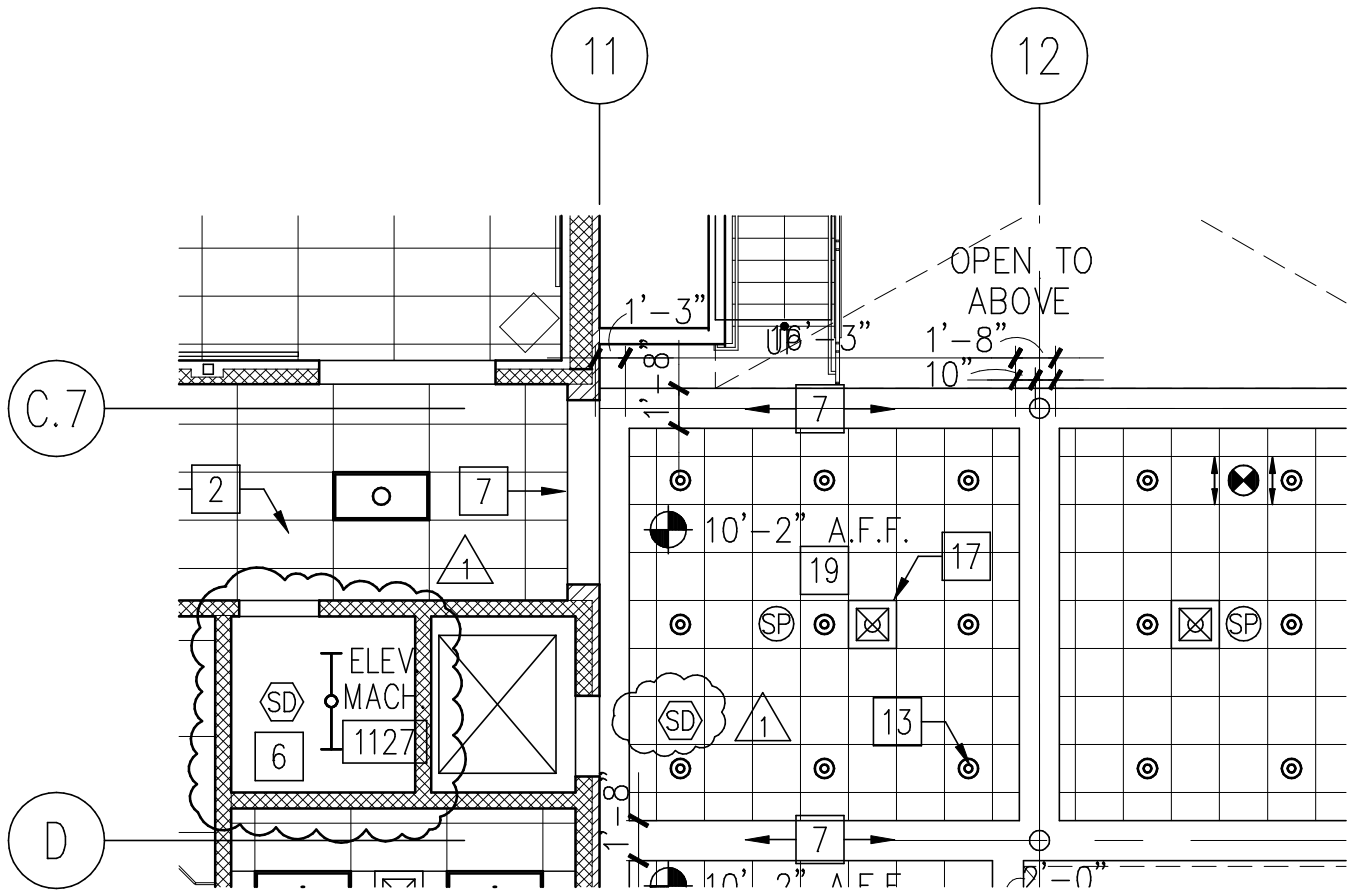
2 AMENDMENT NO. 2, ISSUED 04/21/2003

Einhorn  
Yaffee  
Prescott

ARCHITECTURE &  
ENGINEERING, P.C.

Project: NEVAL THOMAS ELEM. SCHOOL  
650 ANACOSTIA AVE., NE  
WASHINGTON, DC 20019  
Title: ROOF PLAN  
Modifies Drawing No.: A105 Scale: 1/8"=1'-0"

Project No.: 2001016.00  
Designed by: EJ  
Drawn by: DC  
Checked by: SML  
Date: 04/21/2003  
Drawing No.: ADD-A-04



0 1' 2' 4' 8' 1/8"=1'-0"

1 AMENDMENT NO. 2, ISSUED 04/21/2003

Einhorn  
Yaffee  
Prescott



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Project: NEVAL THOMAS ELEM. SCHOOL  
650 ANACOSTIA AVE., NE  
WASHINGTON, DC 20019  
Title: LEVEL ONE REFLECTED  
CEILING PLAN - PART A  
Modifies Drawing No.: A801 Scale: 1/8"=1'-0"

Project No.: 2001016.00  
Designed by: EJ  
Drawn by: DC  
Checked by: SML  
Date: 04/21/2003  
Drawing No.: ADD-A-05

## DOOR SCHEDULE NOTES

1. ALL DOOR FRAMES SHALL BE CONTINUOUSLY WELDED UNLESS OTHERWISE NOTED.
2. REFER TO MECH. DWGS. FOR LOCATIONS OF 3/4" DOOR UNDERCUTS AT NON-RATED DOORS. OTHERWISE, ALL DOOR UNDERCUTS SHALL BE IN ACCORDANCE WITH NFPA-80.
3. AT EXTERIOR DOOR FRAMES, DRILL DOOR FRAME JAMB TO RECEIVE EMPTY SECURITY CONDUIT. SECURITY WIRING AND DEVICE INSTALLATION SHALL BE PERFORMED BY SEPARATE CONTRACTOR. COORDINATE W/ELEC. DWGS. AND DOOR HARDWARE SPECIFICATION. REFER TO BID ALLOWANCE NO. 2.
4. DOOR FRAMES SHALL BE LOCATED 6" FROM FACE OF PARTITION TO FACE OF DOOR UNLESS OTHERWISE NOTED.
5. DOOR TYPES NOTED IN PARENTHESES REFER TO DCPS DOOR TYPE DESIGNATORS.
6. DOOR HARDWARE SETS ARE NON-SEQUENTIAL AND HAVE BEEN SELECTED FROM DCPS DESIGN GUIDELINE (2/15/01) MASTER HARDWARE SET LIST.
7. DOOR LABELS INDICATED REPRESENT GOVERNMENT REQUIREMENTS AS WELL AS CODE REQUIREMENTS.

8. EXTERIOR STEEL DOORS SHALL BE INSULATED STEEL DOOR SYSTEMS, AS SPECIFIED IN SECTION 08110.
9. DOORS 1061 AND 1062 SHALL BE SOUND-RATED, AS SPECIFIED IN SECTION 08110, WITH A STC RATING OF 43, IN ACCORDANCE WITH ASTM E-90.

2

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
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Yaffee  
Prescott




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Project: NEVAL THOMAS ELEM. SCHOOL  
650 ANACOSTIA AVE., NE  
WASHINGTON, DC 20019  
Title: DOOR SCHEDULE  
Modifies Drawing No.: A901 Scale: NONE  
Project No.: 2001016.00  
Designed by: EJ  
Drawn by: DC  
Checked by: SML  
Date: 04/21/2003  
Drawing No.: ADD-A-06

DOOR NUMBER	ROOM NAME	
	FROM	TO
LEVEL ONE (SHEETS NO. A101, A102)		
1001	VESTIBULE	EXTERIOR
1001A	VESTIBULE	EXTERIOR
1002	LOBBY CORRIDOR	VESTIBULE
1002A	LOBBY CORRIDOR	VESTIBULE
1002B	LOBBY CORRIDOR	EXTERIOR
1003	LOBBY CORRIDOR	WELCOME CENTER
1004	WELCOME CENTER	CLOSET
1005	CORRIDOR	CONFERENCE ROOM
1006	CORRIDOR	PRINCIPAL OFFICE
1007	CORRIDOR	CORRIDOR
1008	CORRIDOR	TOILET
1112	KITCHEN	CORRIDOR

THRESHOLD	HDW SET NO.	REMARKS
3/A902	45	ADD POWER DR OPEF
3/A902	39	REFER TO DWG 6/A9
	39	W/ AUTO. DR OPENE
	45	
3/A902	45	REFER TO DWG 6/A9
	28	
	16	
	26	
	28	
	28	
	26	
	6	

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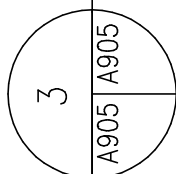


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Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: EJ  
WASHINGTON, DC 20019 Drawn by: DC  
Title: DOOR SCHEDULE Checked by: SML  
Date: 04/21/2003  
Modifies Drawing No.: A901/A902 Scale: NONE Drawing No.: ADD-A-07



ACCENT VCT	VCT-5	VINYL COMPOSITION TILE	MANNINGTON COMMERCIAL
WOOD DOORS	WD-1	PLAIN SLICED RED OAK	MARSHFIELD
PRESENTATION PLATFORM FLOORING	WD-2	WOOD FLOOR	JUNCKERS
PRESENTATION PLATFORM FLOORING	WB-1	WOOD BASE	
VESTIBULE WALK-OFF MAT	WM-1	WALK-OFF MAT	MATS INC.
			SOFT G



## FINISH MATERIAL KEY

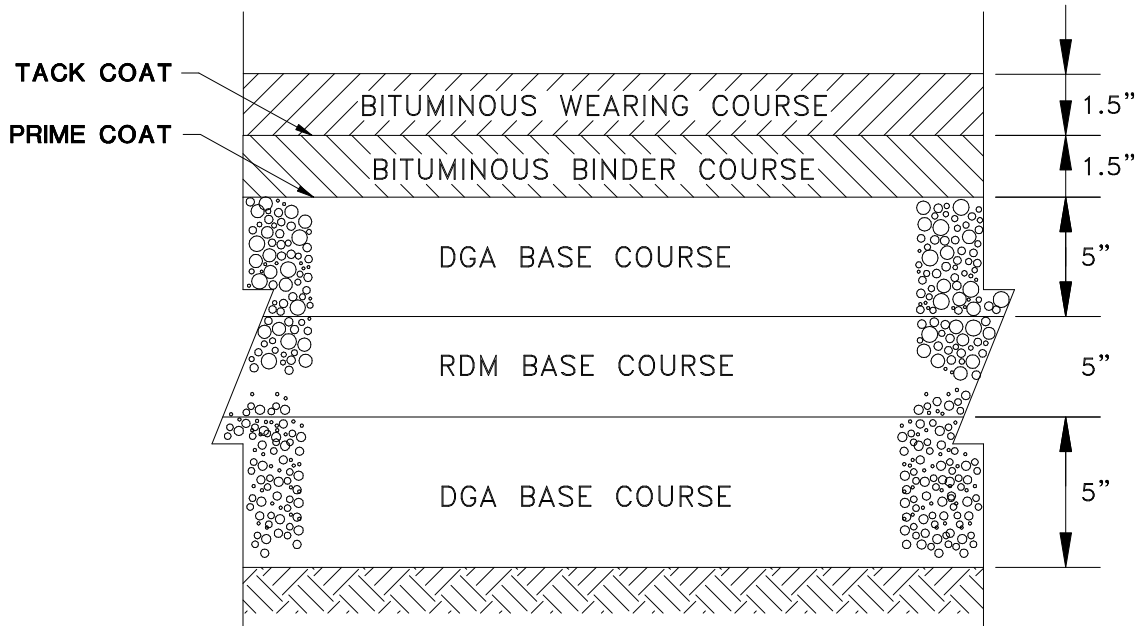
SCALE: NONE

## FINISH SCHEDULE

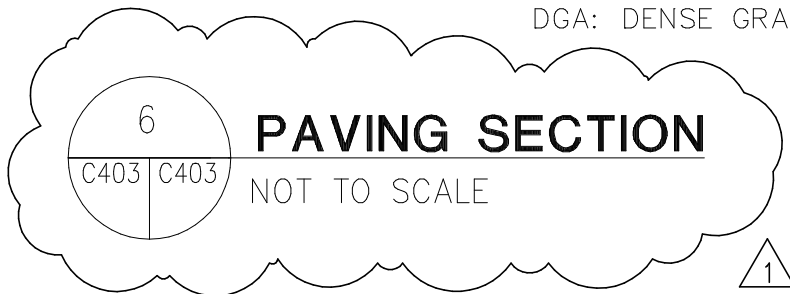
ROOM NUMBER	ROOM NAME	FLOOR	BASE	WALL	CEILING
<b>LEVEL ONE</b> (SHEETS NO. A101, A102) - CONTINUED					
1109A	TOILET ROOM	CT-1,3	CTB-1	CT-6,8/PT-3	APC-2
1110	OFFICE	VCT-1,3	RB-3	PT-1	APC-3
1111	LOADING DOCK				
1112	KITCHEN	QT-1	QTB-1	PT-3	APC-3
1113	SERVERY	QT-1	QTB-1	PT-3	APC-3
1114	CAFETERIA	VCT-1	RB-3	PT-1	AMD-1
1115	CLEANING STORAGE	QT-1	QTB-1	PT-3	APC-3
1116	DRY STORAGE	QT-1	QTB-1	PT-3	APC-3
1117	ELEC.	VCT-1	RB-1	PT-1	P-2
1118	BEFORE/AFTER CARE	CPT-2	RB-3	PT-1	APC-2
1119	P.E. OFFICE	VCT-1,3	RB-3	PT-1	APC-2
1120	GYMNASIUM	VCT-1	RB-3	PT-1	P-2
1121	P.E. STORAGE	VCT-1	RB-3	PT-1	APC-2
1122	MECHANICAL	SEALED CONC.	RB-1	PT-1	P-2
1123	CHAIR STORAGE	VCT-1	RB-1	PT-1	APC-2
1124	PRESENTATION PLATFORM	WD-2	WB-1	PT-1	APC-2
1125	BOYS	CT-1,5	CTB-1	CT-6,10/PT-3	APC-2

1 AMENDMENT NO. 2, ISSUED 04/21/2003





RDM: RAPID DRAINAGE MATERIAL  
DGA: DENSE GRADED AGGREGATE



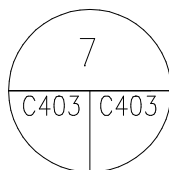
1 AMENDMENT NO. 2, ISSUED 04/21/2003

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Project:	NEVAL THOMAS ELEM. SCHOOL	Project No.:	2001016.00
	650 ANACOSTIA AVE., NE	Designed by:	TR
	WASHINGTON, DC 20019	Drawn by:	CO
Title:	SITE DETAILS - US ARMY	Checked by:	MW
	CORPS OF ENGINEERS	Date:	04/21/2003
Modifies Drawing No.:	C403	Scale:	NONE
		Drawing No.:	ADD-C-02



**NOT USED**

NOT TO SCALE



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Project:	NEVAL THOMAS ELEM. SCHOOL	Project No.:	2001016.00
	650 ANACOSTIA AVE., NE	Designed by:	TR
	WASHINGTON, DC 20019	Drawn by:	CO
Title:	SITE DETAILS - US ARMY	Checked by:	MW
	CORPS OF ENGINEERS	Date:	04/21/2003
Modifies Drawing No.:	7/C403	Scale:	NONE
		Drawing No.:	ADD-C-03



NOTES:

1. SEE SHEET C403 FOR PAVEMENT DETAILS.
2. SEE LANDSCAPE DRAWINGS FOR SIDEWALK LAYOUT AND DETAILS.
3. ALL RADII SHOWN WILL HAVE DIMENSION OF 5' UNLESS NOTED OTHERWISE ON THE PLANS.
4. ALL RADII SHOWN ARE TO EITHER THE CENTERLINE OF THE ROAD OR THE FRONT FACE OF THE CURB.
5. PAVEMENT AND SIDEWALK CROSS SLOPES SHALL NOT EXCEED 2%. LONGITUDINAL SLOPES SHALL NOT EXCEED 5% UNLESS OTHERWISE SHOWN ON THE PLANS.

6. AS FIRST ORDER OF WORK, PLACE FILL TO ELEV. 19.50' WHERE FILL EXCEEDS OR EQUALS ONE FOOT. THE TOP 6 INCHES OF FILL SHALL BE SAND AND GRAVEL.



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Project: NEVAL THOMAS ELEM. SCHOOL  
650 ANACOSTIA AVE., NE  
WASHINGTON, DC 20019  
Title: SITE GRADING AND PAVING  
LAYOUT – PHASE 2  
Modifies Drawing No.: C400 Scale: AS NOTED  
Project No.: 2001016.00  
Designed by: TR  
Drawn by: CO  
Checked by: MW  
Date: 04/21/2003  
Drawing No.: ADD-C-04

## KEYED NOTES

- 1 ALL RECEPTACLES LOCATED NEXT TO THE DATA OUTLETS SHALL BE ISOLATED GROUND (IG) TYPE (ORANGE) RECEPTACLES (TYPICAL). SEE TELCOM DWGS.
- 2 ALL CIRCUITS WITHIN THIS AREA TO BE #12 WIRE. (TYPICAL). DURING FIELD INSTALLATION ANY CIRCUIT SHOWN IN THIS AREA THAT IS ACTUALLY OVER 100' CONTRACTOR TO USE #10 WIRE.
- 3 ALL CIRCUITS WITHIN THIS AREA TO BE WIRED WITH #10 WIRE. (TYPICAL).
- 4 JUNCTION BOX AND DUPLEX RECEPTACLE MOUNTED ABOVE CEILING FOR FUTURE USE FOR A CEILING MOUNTED PROJECTOR.
- 5 CONTRACTOR TO SIZE PULL BOXES PER CODE REQ'MTS & FIELD INSTALLATION. SEE RISER DIAGRAM FOR WIRE SIZES AND CONDUIT SIZE AND NUMBER,
- 6 FOR CONDUIT & WIRE SIZES SEE RISER DIAGRAM ON SHEET E401.
- 7 JUNCTION BOX ABOVE CEILING FOR FIRE ALARM DOOR HOLD OPENERS. COORDINATE WITH FIRE ALARM CONTRACTOR.
- 8 FUTURE PORTABLE GENERATOR (NIC). FOR WORK UNDER THIS CONTRACT, REFER TO DWG E002 FOR CONDUIT SIZES & REFER TO CIVIL DWGS. FOR CONC. PAD LOCATION AND DETAILS.

2 AMENDMENT NO. 2, ISSUED 04/21/2003

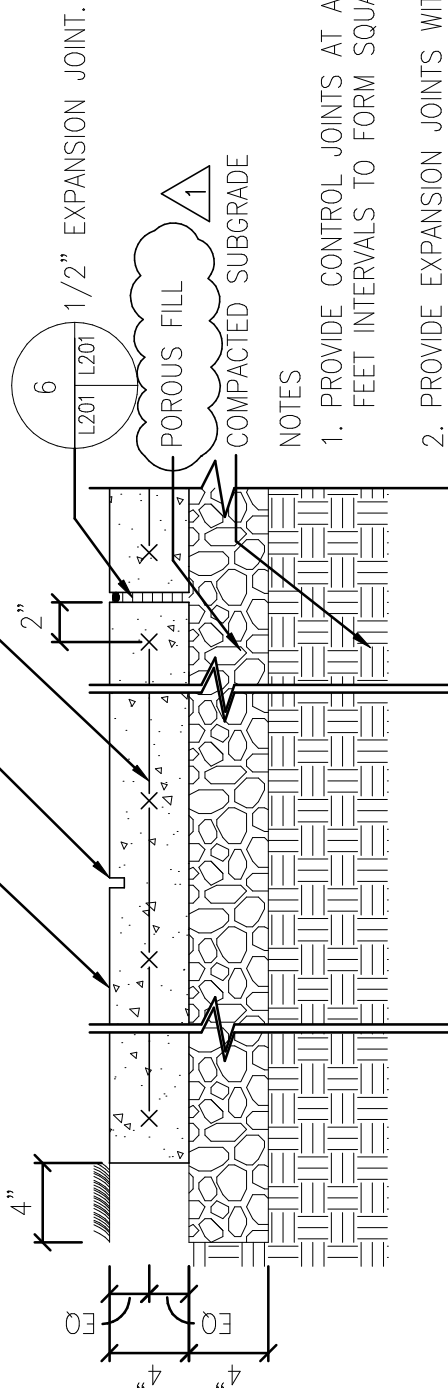
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Project:	NEVAL THOMAS ELEM. SCHOOL	Project No.:	2001016.00
	650 ANACOSTIA AVE., NE	Designed by:	DT
	WASHINGTON, DC 20019	Drawn by:	EF
Title:	LEVEL ONE ELECTRICAL	Checked by:	TS
	POWER PLAN - PART A	Date:	04/21/2003
Modifies	Drawing No.: E201	Scale:	1/8"=1'-0"
		Drawing No.:	ADD-E-05

0 1" 2" 4" 8" 1 1/2"=1'-0"



NOTE: ALL EXPOSED CONCRETE SIDEWALKS TO BE ARCHITECTURAL CONCRETE – LIMESTONE COLOR  
POURED CONCRETE WITH FINE BRUSH FINISH PERPENDI TO SIDEWALK DIRECTION  
TOOLED CONTROL JOINT – 1/4" WIDE x 3/4" DEEP  
6"x6" 2.1x2.1 WELDED WIRE FABRIC – CONTINUOUS WITHIN SLAB

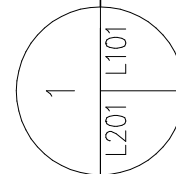
1/2" EXPANSION JOINT.

NOTES

1. PROVIDE CONTROL JOINTS AT APPROXIMATELY 3 TO FEET INTERVALS TO FORM SQUARE PANELS, AS SHO
2. PROVIDE EXPANSION JOINTS WITHIN THE SIDEWALK A AT NOT MORE THAN 30 FEET ON CENTER.  
EXPANSION JOINTS SHALL ALSO BE PLACED WHERE SIDEWALKS ABUT FIXED OBJECTS INCLUDING CURBS, STAIRS, WALLS, AND EXISTING CONCRETE PA

## CONCRETE SIDEWALK

SCALE: 1 1/2" = 1'-0"



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


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
Project: NEVAL THOMAS ELEM. SCHOOL  
650 ANACOSTIA AVE., NE  
WASHINGTON, DC 20019  
Title: SITE DETAILS – PAVING  
COCNCRETE SIDEWALK  
Modifies Drawing No.: L201 Scale: AS NOTED  
Project No.: 2001016.00  
Designed by: EJ  
Drawn by: DC  
Checked by: SML  
Date: 04/21/2003  
Drawing No.: ADD-L-01

D. MATERIALS:

1. THE FOLLOWING ASTM STANDARDS AND DESIGN STRESSES SHALL BE USED FOR THE APPROPRIATE MATERIALS USED IN THE CONSTRUCTION OF THIS PROJECT.
2. CEMENT: ASTM C150; TYPE I OR III  
ASTM C150; TYPE II FOR CONCRETE IN CONTACT WITH EARTH
3. BLENDED HYDRAULIC CEMENT  
(CEMENT SUBSTITUTES): ASTM C595, TYPE IS (LIMIT TO 35% MAX OF CEMENTITIOUS CONTENT BY WEIGHT)
4. AGGREGATES: ASTM C33 (NORMALWEIGHT)
5. ADMIXTURES:
  - a. AIR ENTRAINING ADMIXTURES: ASTM C260
  - b. CHEMICAL ADMIXTURES: ASTM C494
6. CONCRETE: AIR-ENTRAIN ALL EXPOSED CONCRETE  $6\% \pm 1$  TO  $1\frac{1}{2}\%$  BY VOLUME UNLESS OTHERWISE NOTED. NO AIR FOR STEEL TROWEL FINISH.

APPLICATION	F'C @ 28 DAYS (PSI)	WT (PCF)	W/C (MAX)	MAX ALLOWABLE CHLORIDE ION CONTENT
a. CAISSONS	 4000	145	0.55	
b. GRADE BEAMS	4000	145	0.50	
c. SLABS-ON-GRADE	3500	145	0.55	0.30 [1.00]
d. NORMALWEIGHT ON STEEL DECK	3500	145	0.55	



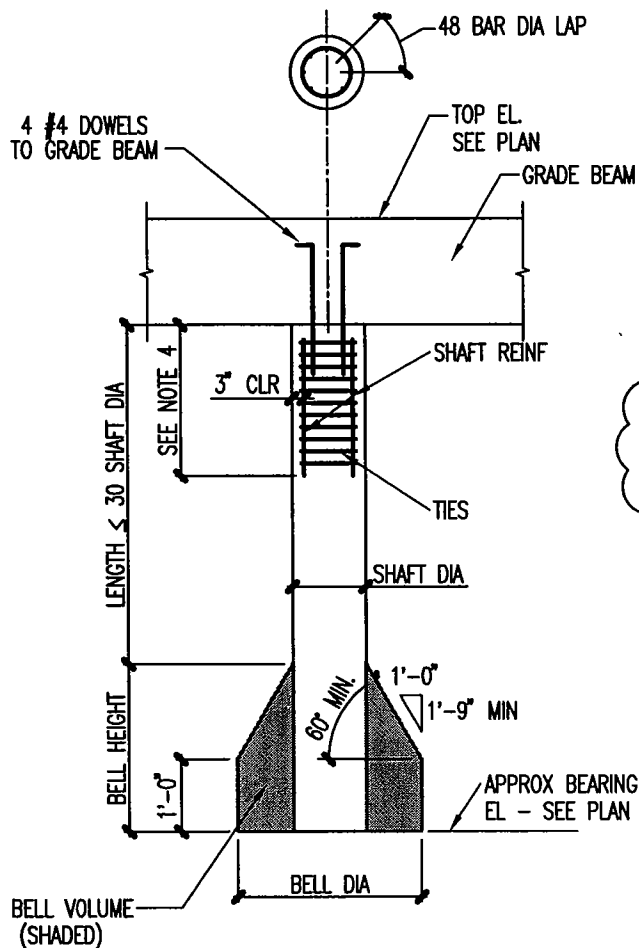
 AMENDMENT NO. 2, ISSUED 04/21/2003

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Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: TTE  
WASHINGTON, DC 20019 Drawn by: AL  
Title: GENERAL NOTES Checked by: TTE  
Date: 04/21/2003  
Modifies Drawing No.: S1.0 Scale: NO SCALE Drawing No.: ADD-S-06



SHAFT DIAMETER	REINF (#, SIZE, SPACING)	
	VERTICAL	TIES
3'-0"	7 #8	#3 @ 16"
3'-6"	7 #9	#3 @ 18"

**NOTES:**

1. SEE PLANS FOR DIAMETER OF SHAFT AND BELL AND TOP AND BOTTOM ELEVATIONS.
2. SEE ACI 336.1, 336.3 AND THE SPECIFICATIONS FOR TOLERANCE ON LOCATION AND PLUMBNESS.
3. THE BOTTOM BEARING SHALL BE LEVEL AND ALL DISTURBED MATERIAL REMOVED.
4. EMBED  $\geq 3 \times$  SHAFT DIAMETER (OR 10'-0" MINIMUM).

# **1 DRILLED PIER WITH BELL (CAISSON)**

N.T.S.



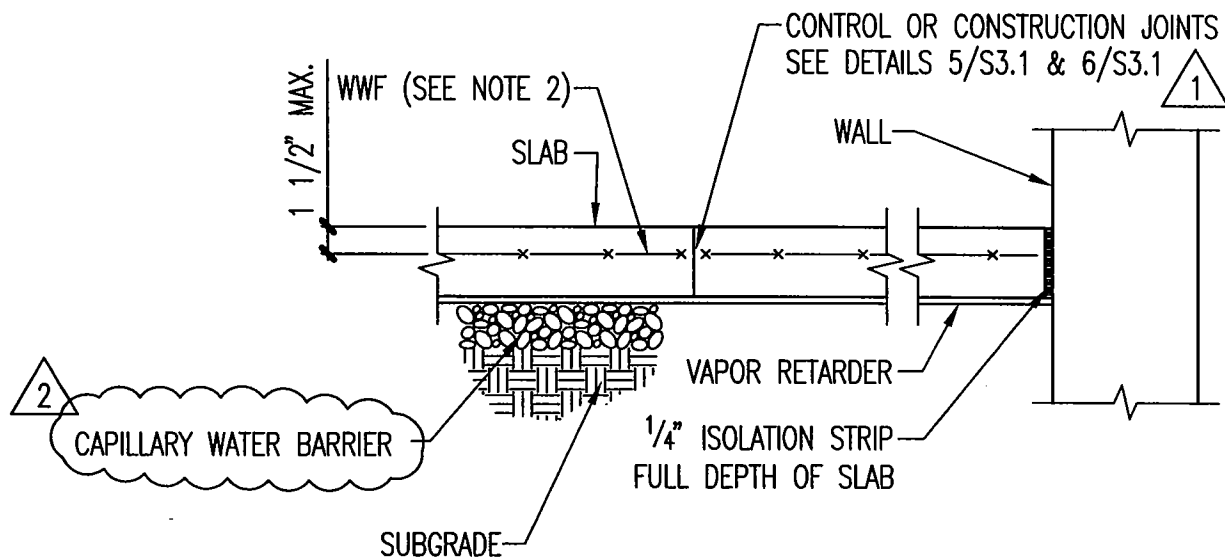
**2** AMENDMENT NO. 2, ISSUED 04/21/2003

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Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: TTE  
WASHINGTON, DC 20019 Drawn by: AL  
Title: DRILLED PIER WITH BELL DETAIL Checked by: TTE  
Date: 04/21/2003  
Modifies Drawing No.: S3.0 Scale: N.T.S. Drawing No.: ADD-S-07



- NOTES: 1) SEE SEQUENCE OF PLACING SLAB ON GRADE FOR LOCATION OF JOINTS.
- 2) PROVIDE SUPPORT CHAIRS TO HOLD WWF AND/OR REINFORCING IN POSITION DURING CONCRETE PLACEMENT.

## 3 SLAB ON GRADE

N.T.S.



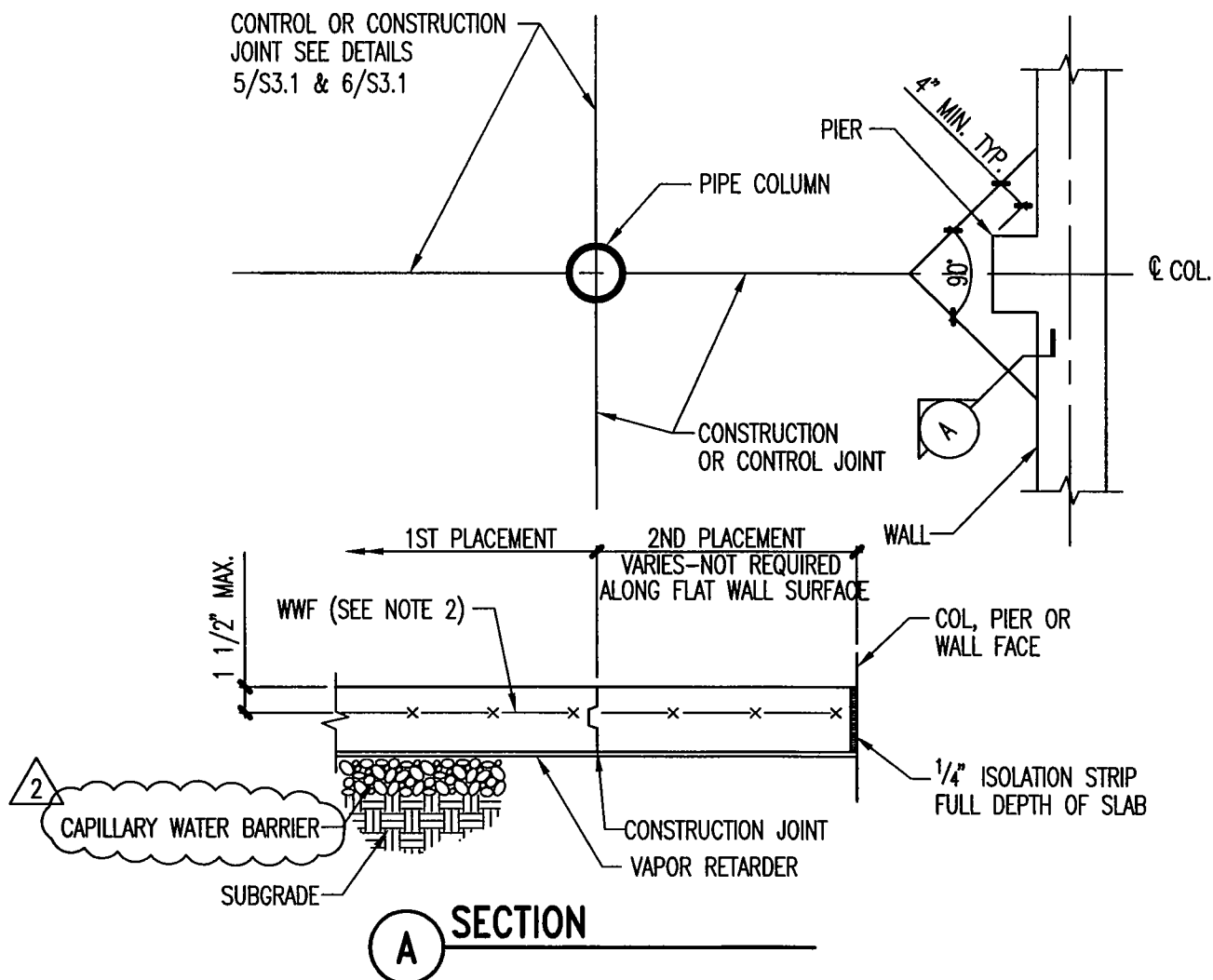
2 AMENDMENT NO. 2, ISSUED 04/21/2003

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Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: TTE  
WASHINGTON, DC 20019 Drawn by: AL  
Title: SLAB ON GRADE Checked by: TTE  
Date: 04/21/2003  
Modifies Drawing No.: S3.1 Scale: N.T.S. Drawing No.: ADD-S-08



- NOTES: 1) SEE SEQUENCE OF PLACING SLAB ON GRADE FOR LOCATION OF JOINTS.  
2) PROVIDE SUPPORT CHAIRS TO HOLD WWF AND/OR REINFORCING IN POSITION DURING CONCRETE PLACEMENT.

## 4 JOINTS AT COLUMNS AND PIERS FOR SLAB ON GRADE



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Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: TTE  
WASHINGTON, DC 20019 Drawn by: AL  
Title: JOINTS AT COLUMNS AND PIERS Checked by: TTE  
FOR SLAB ON GRADE Date: 04/21/2003  
Modifies Drawing No.: S3.1 Scale: N.T.S. Drawing No.: ADD-S-09

HARDBOARD  
L EDGES ON

$\frac{1}{4}$ "

$T/4$

WWF

$1\frac{1}{2}$ " MAX.

$\frac{1}{2}$ "

CUT ALTERNATE WIRES OF WWF AT JOINT

2

- ## 6 SLAB ON GRADE CONTROL JOINT FOR TYPICAL SLABS



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Project: NEVAL THOMAS ELEM. SCHOOL  
650 ANACOSTIA AVE., NE  
WASHINGTON, DC 20019  
Title: SLAB ON GRADE CONTROL JOINT  
DETAIL

Project No.: 2001016.00  
Designed by: TTE  
Drawn by: AL  
Checked by: TTE  
Date: 04/21/2003  
Drawing No.: ADD-S-10



NOTES: PROVIDE VERTICAL CONTROL JOINTS IN THE CONCRETE MASONRY UNIT PORTION OF ALL WALLS AND PARTITIONS AS FOLLOWS.

- 1) AS SHOWN ON ARCHITECTURAL WALL ELEVATIONS.
- 2) WHEN WALL LENGTH EXCEEDS 25 FEET.
- 3) AT JUNCTIONS OF BEARING AND NON-BEARING WALLS, CHANGES IN WALL HEIGHT OR THICKNESS, JUNCTIONS OF WALL WITH COLUMNS AND PIERS AND INTERSECTING WALL AND PARTITION JUNCTION WHEN THE PARTITION EXCEEDS 12'-0".
- 4) CONTROL JOINT SPACING SHALL NOT EXCEED 30'-0" WHENEVER FEASIBLE. CONTROL JOINTS MAY BE BEST LOCATED AT THE ENDS OF LINTELS OVER DOOR OPENINGS AND EXTEND UP FOR THE REMAINDER OF THE WALL HEIGHT.
- 5) CONTROL JOINTS TO EXTEND THRU ENTIRE WALL THICKNESS AND FOR FULL WALL HEIGHT.
- 6) SUBMIT CONTROL JOINT LOCATIONS AS A SHOP DRAWING SUBMITTAL.

2

11

## CONTROL JOINT NOTES CONCRETE MASONRY



AMENDMENT NO. 2, ISSUED 04/21/2003

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Project: NEVAL THOMAS ELEM. SCHOOL

Project No.: 2001016.00

650 ANACOSTIA AVE., NE

Designed by: TTE

WASHINGTON, DC 20019

Drawn by: AL

Title: CONTROL JOINT NOTES

Checked by: TTE

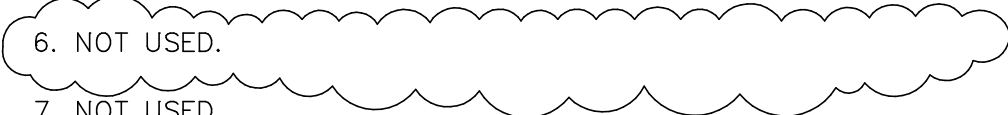

CONCRETE MASONRY

Date: 04/21/2003

Modifies Drawing No.: S3.2 Scale: NO SCALE

Drawing No.: ADD-S-11

## GENERAL NOTES

1. ALL CONDUITS, RACEWAYS, CABLE TRAYS, JUNCTION BOXES, BACKBOXES/FLOOR BOXES, JACI BACKBONE AND ALL HORIZONTAL CABLING SHALL BE PROVIDED BY UNDER THIS CONTRACT. REFER TO SPECIFICATIONS.
2. ALL CABLES SHALL ORIGINATE AND TERMINATE BASED ON THE OUTLET LOCATION AND ASSOCIATED SYMBOL LEGEND AND NOTES.
3. ALL STATION CABLES ROUTED VIA THE CEILING OF FLOOR BELOW SHALL BE BUNDLED SEPARATELY FROM THE CABLES SERVING WORKSTATION OUTLETS ON THAT FLOOR.
4. WORKSTATION CABLING THAT BRANCHES OFF OF THE CABLE TRAY, AND/OR KINDORF FRAMIN SHALL BE SUPPORTED USING J-HOOKS OFF OF CEILING SUPPORT HANGERS NO MORE THAN 5 FEET APART TO ELIMINATE CABLE STRESS. BUNDLES SHALL NOT EXCEED IN DIAMETER, AND SHOULD BE TIE WRAPPED NO MORE THAN 6 FEET ON CENTER.
5. TELECOMM JUNCTION BOX/BACKBOX CONDUITS USED TO FEED TELECOMM WORKSTATIONS IN INACCESSIBLE CEILING AREAS SHALL BE EXTENDED TO NEAREST ACCESSIBLE CEILING AREA ON THE SAME FLOOR.
6. NOT USED.  
7. NOT USED.
8. NO FURNITURE OUTLET SYMBOLS ARE SHOWN ON THE FLOOR PLANS FOR THE FURNITURE MOUNTED OUTLETS. WHERE A TELECOMMUNICATIONS TAG IS SHOWN ON THE FLOOR PLAN IT SHALL BE UNDERSTOOD THAT A TELECOMMUNICATIONS OUTLET SHALL BE PROVIDED FOR THAT SPECIFIC LOCATION.
9. CONTRACTOR TO MAKE SURE THAT CONDUITS FOR TELECOMMUNICATIONS ARE INTERRUPTED WITH A JUNCTION BOX/PULLBOX (SIZED PER EIA/TIA STANDARDS) AFTER THE SUM OF THE BENDS ADDS UP TO 180 DEGREES. CONTRACTOR TO FOLLOW ALL EIA/TIA STANDARDS WHEN PROVIDING THE TELECOMMUNICATIONS INFRASTRUCTURE AND ASSOCIATED REQUIREMENTS IN THE ELECTRICAL SCOPE OF WORK.



AMENDMENT NO. 2, ISSUED 04/21/2003

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Project: NEVAL THOMAS ELEM. SCHOOL Project No.: 2001016.00  
650 ANACOSTIA AVE., NE Designed by: DT  
WASHINGTON, DC 20019 Drawn by: EF  
Title: TELECOMMUNICATIONS Checked by: TS  
GENERAL NOTES Date: 04/21/2003  
Modifies Drawing No.: T001 Scale: NONE Drawing No.: ADD-T-01